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A 2-year continuation of one of the 27 U. S. Office of Education First Grade Reading Studies is reported. Students in the linguistics approach were initially taught to read using the experimental edition of "A Basic Reading Series Developed upon Linguistic Principles" by Charles C. Fries and others. Students in the basal reader approach were initially taught to read using the "New Basic Readers" (sixties edition) by Scott, Foresman. Data were analyzed by total treatment, ability score level, and sex. When the two treatment groups were considered as a whole and when performance on all of the criterion measures was considered, neither of the two approaches proved more effective at the end of grades 2 and 3. Although significant differences were found for some of the subskills in reading or related areas, neither of the approaches demonstrated superior performance in all aspects of the reading process. At the end of grade 2, students in the basal reader treatment showed significantly superior achievement in word study skills, spelling, and oral reading accuracy. At the end of grade 3, students in the linguistic group showed superior performance in the rate of oral reading and number of words used in written compositions. (Author/WB)

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August 1968

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J. Wesley Schneyer
Sheila Cowen

University of Pennsylvania

Philadelphia, Pennsylvania

August
1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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CHAPTER I

THE PROBLEM

During the 1964-65 school year the Cooperative Research Branch of the U.S. Office of Education supported twenty-seven studies of first-grade reading instruction. These research projects were coordinated by the Coordinating Center for the Cooperative Research Program in First-Grade Reading Instruction established at the University of Minnesota in 1964 under the direction of Dr. Guy Bond and Dr. Robert Dykstra.

One of these projects was conducted by the present investigators at the University of Pennsylvania in cooperation with the School District of Philadelphia. This was a comparative study of the reading achievement of first-grade children taught by a basal reader approach with the reading achievement of first-grade children taught by a linguistic approach. The results of this study were reported previously (Schneyer, Schultz, and Cowen, 1966).

Thirteen of the original first-grade studies were funded by the U. S. Office of Education for a second year of investigation and several of these studies were funded for an additional third year of study. The University of Minnesota Coordinating Center continued to function during the second year of the project. Data common to the first-grade and second-grade cooperative studies were analyzed by the University of Minnesota Coordinating Center. Reports covering cooperative aspects of the studies during the first and second grades have been issued by the Coordinating Center (Bond and Dykstra, 1967; Dykstra, 1967).

This report presents the results of the two year extension of the first-grade study into the second grade (during the school year 1965-66), and into the third grade (during the school year 1966-67). The research was carried on for two additional years in order to provide a continuing evaluation of the effects on reading achievement of children for whom reading instruction was initiated under two different approaches. The two approaches were: (1) a linguistic approach using a basic reading series developed upon the linguistic principles as described by Fries (1963); and (2) a basal reader approach employing the Scott, Foresman basal reader program.

Previous comparative studies of first-grade reading methods have sometimes resulted in questionable conclusions because of their limited duration. The results of such studies may even be misleading. It is entirely possible that one method of beginning reading instruction may produce immediate or short-term superiority that is not maintained beyond the initial growth period. Another approach may produce slower growth initially, but result in accelerated gain at a later period. It seemed, therefore, highly desirable that comparative studies be extended at least through the third grade to provide results of maximum value for the application of the research.

Recommendations for basing beginning reading instruction upon linguistic principles, as employed in one of the methods compared in the present study, have been offered for a long time. Over thirty years ago, a noted scholar in linguistics, the late Leonard Bloomfield, criticized the then conventional approach to teaching beginning reading because the instructional materials presented words "in a mere hodge-podge, with no rational progression" (1933, pp. 499-503). He urged stringent reforms in the teaching of beginning reading that would be based upon linguistic principles. In 1942 Bloomfield elaborated on his theoretical notions and their practical applications in two articles published in Elementary English (1942). Since most children enter first grade with a sizeable mastery of oral language, Bloomfield argued, the first materials used for beginning reading instruction should consist of words already in the child's spoken vocabulary. The child should be taught to recognize in print words he already speaks. Bloomfield further stated that since English spelling is frequently irregular, the first words the child is taught to read should be those that are spelled regularly. Irregularly spelled words should not be taught until later stages of instruction, and then only gradually and systematically.

Bloomfield placed his emphasis in beginning reading instruction on learning to break the "code" or printed form representing the uttered sound. Since the words in beginning readers were already in the spoken vocabulary of most children, meaning would follow naturally. He emphasized that the first step in learning to read should be mastery of the alphabet.

Bloomfield's work was virtually ignored until

Rudolph Flesch's Why Johnny Can't Read (1955) appeared, severely criticizing the prevailing methods of teaching reading. Flesch cited Bloomfield's work in support of his own notions which included heavy emphasis on phonics instruction. Within the next several years linguistic approaches to the teaching of beginning reading were also advocated by Sofietti (1955), Smith (1959), Hall (1961), and Lefevre (1964).

One of the more recent linguistic approaches to the teaching of beginning reading is the spelling-pattern approach emphasizing the regularities of the spelling system in English as described by Fries (1963) in Linguistics and Reading. Based upon the theoretical formulations and applications described in his text, Fries and three associates (1963-65) produced a set of experimental reading materials for use in beginning stages of reading instruction. These materials consisting of an alphabet book, a series of eight readers, and practice books, were introduced into a number of first-grade classes in the Philadelphia schools on a trial basis. Pupils in the linguistic treatment of the present experiment used these linguistic reading materials for the first stage of beginning reading instruction.

The objective of the study reported herein was to compare the reading achievement of second-grade and third-grade children (at above average, average, and below average intelligence levels) who were initially taught to read by the Fries linguistic approach with the reading achievement of second-grade and third-grade children (at above average, average, and below average intelligence levels) who were initially taught to read by the Scott, Foresman basal reader approach.

Review of Related Research

While there are currently available several beginning reading programs which claim to be based upon linguistic principles, there is a paucity of reported research comparing these approaches with other approaches to the teaching of beginning reading. Current programs purported to be based upon linguistic principles include: Allen and Allen (1964); Bloomfield and Barnhart (1964); Daniels and Diack (1960); Hall (1960); Rasmussen and Goldberg (1964); Stern (1963); Stratemeyer and Smith (1963). As Chall (1967, p. 34) notes: "In many respects the linguistic innovations resemble the phonic innovations, although many linguistic scholars oppose the phonic innovations as much as they do the conventional programs."

Related comparative studies using materials based upon linguistic principles are described below.

Sister Mary Fidelia (1959) involved 1,064 first-grade children in eleven schools in Chicago and nearby areas in a comparative study of the effects of a linguistic approach and a phonic approach to word attack. The experimental group received instruction in word attack skills based upon Bloomfield principles, while the control group was taught word attack skills and an analytic phonic approach. Analysis of variance results revealed no significant differences between the two groups on standardized silent reading tests at the end of six months. One of the weaknesses in this study is that pupils in the experimental group used conventional basal readers in addition to the Bloomfield materials. Since irregularly spelled words are included in the basal reader materials and excluded from the Bloomfield materials, the validity of any conclusions regarding the effectiveness of the Bloomfield materials is highly questionable.

Another study was reported by Sister Mary Edward (1964) and was conducted with parochial school children in Dubuque, Iowa and Detroit, Michigan. This investigation involved an experimental group using a basal reading course supplemented by a word recognition program having a "modified linguistic approach" based upon Bloomfield materials and a control group using conventional basal reader materials. Pupils in the study received instruction in one of the two approaches over a three year period. The investigator reported that:

> . . . although both samples performed above the national norms on all reading tests, the boys and girls of the experimental group recognized words in isolation more readily, used context clues with greater facility, had fewer orientation problems, possessed greater ability to analyze words visually, and had greater phonetic knowledge than boys and girls taught with the control method. There were no significant differences between the two samples in their ability to synthesize words.
>
> The experimental boys and girls read faster and more accurately, had larger

> vocabularies, and were more able to retain factual information than the control boys and girls. However, when more complex comprehension abilities were examined, no significant differences were found between the two groups (p. 512).

Conclusions in this study are also questionable, since both groups used basal readers and the Bloomfield materials were modified to include irregular spellings as well as the regular spellings. This study does not contribute toward an understanding of whether the use of regularly spelled words in an instructional reading program produces reading achievement superior to a program which uses irregularly spelled words.

Sheldon and Lashinger (1966) in their first-grade reading study supported by the USOE, compared the reading achievement of first-grade children taught in three beginning reading approaches: seven classes were taught by a conventional basal reader approach, seven classes were taught by the Bloomfield-Barnhart approach, and seven classes used a synthetic phonic approach. There were no significant differences in reading achievement among the three groups at the end of first grade. The experiment was extended into the second grade using the same classes of children.

At the end of second grade, an analysis of covariance of Stanford Achievement Test results indicated that the linguistic group and phonics group had significantly higher mean scores on Stanford Word Meaning and Spelling subtests than did the basal reader group, while there were no significant differences among the three treatment groups on the Stanford Paragraph Meaning and Word Study Skills subtests. The authors concluded that:

> All three of the approaches to primary instruction proved to be effective for reading instruction at the second grade level. Although some significant differences were noted in some of the subskills or related skills of the total reading process, as they were measured in this study, none of the approaches was demonstrated to be superior in all aspects of reading (1967, p. 725).

Ruddell (1966) investigated the effects of four programs of reading instruction upon the reading achievement of first-grade pupils. The four programs taught to pupils in twenty-four classrooms varied in extent of phoneme-grapheme correspondence and in the extent of provision for emphasis on language structure as related to meaning.

Schneyer, Schultz, and Cowen (1966) compared the reading achievement of twelve classes of first-grade children taught by a basal reader approach with twelve classes taught by a linguistic approach. There were four classes at each of three intelligence levels within each treatment. The pupils in the basal reader group used the Scott, Foresman New Basic Readers and the pupils in the linguistic group used the experimental edition of basic readers developed according to linguistic principles by Charles C. Fries, et al (1963-65). At the end of the first grade, there were significant differences between treatment means, based on analysis of covariance results, favoring pupils in the basal reader group on four of the five subtests of the Stanford Achievement Test, Primary I Battery (Paragraph Meaning, Vocabulary, Spelling, and Word Study Skills). There were, however, significant interactions between treatment and ability levels, indicating that differences were not consistent at all ability levels. Pupils in the linguistic group were superior in the linguistic reading test. The authors concluded that, based upon the results of all tests at all ability levels, neither approach was superior in producing overall reading achievement.

The lack of controlled longitudinal studies comparing the effects of a linguistic approach and a basal reading approach on the reading achievement of primary grade pupils prompted the extension of the previously cited first-grade comparative study by the present investigators into the second and third grades.

Hypotheses

The purpose of this study was to test the following null hypotheses:

1. There is no significant overall difference between the reading achievement of second-grade pupils initially taught to read by a linguistic approach and the reading achievement of second-grade pupils initially taught to read by a basal reader approach.

2. There is no significant difference between the reading achievement of second-grade pupils initially

taught to read by a linguistic approach and the reading achievement of second-grade pupils initially taught to read by a basal reader approach at high, average, or low ability score levels.

3. There is no significant difference between the reading achievement of second-grade boys and the reading achievement of second-grade girls initially taught to read by a linguistic approach and by a basal reader approach.

4. There is no significant interaction between treatment and ability score levels in the reading achievement of second-grade pupils initially taught to read by a linguistic approach and by a basal reader approach.

1'. There is no significant overall difference between the reading achievement of third-grade pupils initially taught to read by a linguistic approach and the reading achievement of third-grade pupils initially taught to read by a basal reader approach.

2'. There is no significant difference between the reading achievement of third-grade pupils initially taught to read by a linguistic approach and the reading achievement of third-grade pupils initially taught to read by a basal reader approach at high, average, or low ability score levels.

3'. There is no significant difference between the reading achievement of third-grade boys and the reading achievement of third-grade girls initially taught to read by a linguistic approach and by a basal reader approach.

4'. There is no significant interaction between treatment and ability score levels in the reading achievement of third-grade pupils initially taught to read by a linguistic approach and by a basal reader approach.

CHAPTER II

PROCEDURES

The present investigation is one of fourteen studies which are continuations of the First-Grade Reading Studies supported by the Cooperative Research Branch of the U. S. Office of Education. The first-grade study was conducted during the 1964-65 school year and has previously been cited. The second-grade study was conducted during the 1965-66 school year and the third-grade study was conducted during the 1966-67 school year.

Meetings of the project directors and Coordinating Center staff were held to agree on types of data to be collected, measuring instruments to be used, variables to be controlled, and procedures for collecting and treating the data.

While certain common procedures were employed in the first-grade and second-grade studies, each investigation retained some unique elements. The third-grade studies were not coordinated and some of the common features of the first two years were dropped while others were retained. The procedures described below include both the common and unique features of the investigation.

Design

The basic design of the first-grade reading study involved a comparison of the reading achievement of twelve classes of first-grade children who were taught to read by a linguistic approach with the reading achievement of twelve classes of first-grade children who were taught to read by a basal reader approach. The twelve classes in each treatment group consisted of four classes at each of three ability score levels. The twenty-four classes, with only one class from each of twenty-four different schools, consisted of pupils who entered first grade in Philadelphia public schools in September 1964. The pupils in the twenty-four classes were grouped for analysis purposes into a 2 x 3 x 2 factorial design: treatment by ability score level by sex. The four classes at a given ability score level for a given treatment were formed into two cells, one for boys and one for girls.

The basic design for the second-grade and third-grade studies was essentially the same as that of the first-grade study except that there were twenty-two classes involved during the latter two years instead of the twenty-four classes in the first-grade study. One class was lost in each of the two treatment groups. In the linguistic treatment there were three classes instead of four at the low ability score level and in the basal reader treatment there were three classes instead of four at the average ability score level.

Selection of Schools and Teachers

Since the schools in the second and third years of the experiment were the same as those in the first year (except for two as noted above), the procedure followed in the selection of schools and teachers for the first-grade study will be described below.

The first step in the process of selecting schools to participate in the experiment was carried out in the spring of 1964, when a letter describing the project in detail was sent to all principals of public elementary schools in the city of Philadelphia. The letter invited principals interested in participating in the research project to submit the names of competent and experienced first-grade teachers in their schools who volunteered to participate in the program. The principals were told that if they agreed to participate they would not know in advance to which treatment group their pupils would be assigned. The principals were also requested to submit the median I.Q. for the class for any teacher who volunteered. The median I.Q.'s were based upon the scores of the Philadelphia Verbal Ability Test (PVA) routinely administered to kindergarten pupils in the spring of 1964. This test provides I.Q.'s in ten point intervals ranging from 80 to 130.

Seventy-five principals and ninety-seven teachers accepted the invitation to participate in the research project. (Several of the replies included the names of more than one teacher in the school who had volunteered.)

Before proceeding with the final selection of classes, the average median I.Q. of previous first-grade classes in each of the volunteering schools was obtained from the Division of Research of the School District of Philadelphia.

The schools were then grouped into three levels based upon the median PVA I.Q.'s; a high ability score level (class median I.Q.'s of 120 and 130); an average ability score level (class median I.Q.'s of 100 and 110); and a low ability score level (class median I.Q.'s of 80 and 90.)* From this list of schools by PVA levels, four different schools at each of the three ability score levels were randomly selected and randomly assigned to each treatment group. The final step was the random selection of one teacher from each of the twenty-four schools. As noted previously, neither principals nor teachers knew in advance to which treatment group they would be assigned.

During the second and third years of the continuation study the teacher who was assigned to the class following the principal's usual procedure in the school became the teacher for the class in the experiment. In two cases, teachers who would not participate in the project were replaced by other teachers assigned by the principal.

Description of the Sample

The sample used in the investigation is described below in terms of community, schools, teachers, and pupils.

The Community

Philadelphia, the fourth largest city in the nation, has a population of over two million persons. Based on 1960 census data for racial distribution of population, approximately three-quarters of this population were white. The one-quarter of the population that was non-white was composed mostly of American Negroes, with Puerto Ricans making up less than one per cent of the group. Since 1950 the white population in the city has been decreasing, while the non-white population has been increasing. Although the non-white population is largely concentrated in certain sections of the city, there are a few neighborhoods where the races are integrated. Like most large cities, the neighborhoods in Philadelphia vary from those that are entirely residential to those that are mixed residential and commercial. The quality of available housing also varies widely from most desirable to least desirable. In many of the older, run-down areas, housing developments are being constructed.

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*These PVA scores are levels represented by the ability score levels referred to throughout this report.

Table 1 indicates the median income, median education, and population for each school neighborhood as obtained from the 1960 census tract data. Although the census tract does not necessarily correspond to the local school district, the data do in some measure describe the community in which the school is located. In general, there is a tendency for education and income to follow the trends of ability score levels in both treatment groups, with some overlap in adjacent ability score levels. While there is wide variation in population within the census tracts, there is some tendency for the schools with pupils at the high ability score level to be in neighborhoods that are less heavily populated. Although administrative policy of the School District of Philadelphia did not provide for school population breakdowns on an ethnic basis, it is evident from census tract data as well as personal observation that schools E and F in the basal reader group were in areas that had between 10 and 20 per cent Negro population and that schools J and K were in predominately Negro areas. In the linguistic group, schools T, V, W, and X were in areas with predominately Negro populations.

The Schools

The School District of Philadelphia is divided into eight administrative districts with a district superintendent responsible for each. In September 1964, when the first-grade experiment began, there were 204 elementary schools with a total enrollment of 155,949 and a first-grade enrollment of 25,517. Individual school populations ranged from schools with about 175 pupils to schools with about 2,100 pupils.

The organization of the first three grades of the elementary school in Philadelphia was changed to an ungraded plan about six years ago. This ungraded primary unit is known as the Continuous Progress Primary (CPP) program and is designed for the homogeneous grouping of children in the first three grades on the basis of intellectual maturity and achievement, and to provide for the adjustment of the program to the rate of development of the individual child. Except for a few schools having only one first year class, administrative provision is made for differences in levels of achievement and rates of progress.

Table 1

COMMUNITY CHARACTERISTICS FOR SCHOOLS FOR CENSUS TRACT IN WHICH SCHOOL IS LOCATED

	Treatments							
	Basal Reader Approach				Linguistic Approach			
Ability Score Levels	Schools	Median Years of Education Completed by Adults	Median Income by Family & Unrelated Adults	Population	Schools	Median Years of Education Completed by Adults	Median Income by Family & Unrelated Adults	Population
High	A	12.1	$5,720	4,290	M	9.9	$5,993	6,246
	B	12.1	7,069	2,980	N	11.4	6,778	14,043
	C	12.3	6,697	6,824	O	12.1	7,278	8,289
	D	11.7	7,310	7,537	P	11.1	6,431	7,382
Average	E	8.7	4,834	18,671	Q	8.9	5,881	9,501
	F	10.8	5,027	6,152	R	10.5	5,046	10,428
	G	12.1	7,182	3,987	S	8.9	5,299	11,091
	H	10.9	5,917	8,375	T	10.5	4,631	7,660
Low	I	7.8	1,825	1,237	U	8.9	2,672	6,060
	J	8.6	2,510	8,733	V	8.9	4,028	16,796
	K	8.8	2,909	11,541	W	8.9	4,028	16,796
	L	8.3	4,801	13,613	X	9.4	3,748	8,857

Source: U. S. Bureau of the Census, *U. S. Censuses of Population and Housing: 1960, Census Tracts*. *Final Report PHC (1) - 116*. U. S. Government Printing Office, Washington, D. C., 1962.

To foster this continuous growth, the CPP Program is organized into levels based upon a sequential arrangement of skills and subject matter primarily in the areas of reading and arithmetic. For purposes of reading instruction, the program is organized into eight levels that parallel books of the basal reading systems, that is from pre-reading and readiness material at level 1 through the 3^2 reader at level 8. For pupils who achieve above level 8 before entrance into fourth grade, a level 9 is included to provide for enrichment through wide reading experiences and related activities. A few children may complete the Primary unit in two years, most complete it in three years, while some require four years. Progress depends partly on the philosophy and practices of pupil acceleration held by the faculty and administrators.

The elementary school instructional program is organized into the following broad areas: language arts, social studies, arithmetic, science, physical education, health, art, and music.

Each of the eight districts within the city has the services of supervisors, collaborating teachers, and consulting teachers. The supervisors work in the areas of art, music, and physical education. Collaborating teachers, three or four of whom are assigned to a district, are selected for three year periods to assist in the improvement of instructional programs in language arts, arithmetic, science, and social studies. Each district is assigned a consulting teacher who works with beginning teachers.

During the school year 1963-64, the School District of Philadelphia inaugurated the Educational Improvement Program (EIP) for first year classes of the primary unit where pupil achievement on standardized tests in the basic skills, particularly in reading, was significantly below "grade level" norms. This program provides for a class size limit of approximately 30 pupils, special consultants to assist teachers in the instructional program, and special supplementary teaching materials. All of the schools in the low ability score level in each treatment were EIP schools.

Every classroom in the project had some library books. In the extension stage of the project, library books of equivalent value were provided each classroom in the experiment. Those classes in the EIP schools received additional library books supplied by the School District.

Each school day was five hours long for all pupils.

The length of the school year during the second grade was 184 days and during the third grade it was 183 days. During the second year of the project the average per-pupil cost for instruction was $560; during the third year the average per-pupil expenditure was $640.

The Teachers

The average age of the twenty-two second grade teachers participating in the research project was 39 years, with a range from 23 years to 60 years. Teachers in the linguistic treatment had an average age of 33 years, with a range from 23 years to 55 years. The average age of the teachers in the basal reader treatment was 45 years, with a range from 28 years to 60 years. The average age of the twenty-two third grade teachers was 37 years with a range from 21 to 59 years. Teachers in the linguistic treatment had an average age of 37 years, with a range from 22 years to 59 years. The average age of the teachers in the basal reader treatment was 40 years, with a range from 21 years to 57 years.

Second-grade teachers had an average of 11 years of total teaching experience, with a range from 0 to 35 years. The teachers in the linguistic treatment had taught for an average of 5 years, with a range from 0 to 13 years. The average years of teaching experience for the basal reader teachers was 16.81 years, with a range from 1 year to 35 years. Third-grade teachers had an average of 11.60 years of previous teaching experience, with a range from 0 to 32 years. The teachers in the linguistic treatment had taught for an average of 12.00 years, with a range of 5 months to 32 years. The average years of total teaching experience for the teachers in the basal reader treatment was 10.00 years with a range from 0 to 31 years.

Nineteen of the twenty-two second-grade teachers had taught second grade previously, with an average of 4 years, and a range from 0 to 17 years. The teachers in the linguistic treatment had an average of 2 years experience teaching second grade, with a range from 0 to 6 years. The average number of years experience in teaching second grade in the basal reader group was 6.0, with a range from 0 to 17 years. Nineteen of the third-grade teachers had taught third grade previously, with an average of 5 years, and a range from 0 to 15 years. The teachers in the linguistic treatment had an average of 5.00 years experience teaching third grade, with a range from 0 to 15 years. The teachers in the basal reader group averaged 5.00 years experience teaching third grade, with a range from 0 to 10 years.

Nine of the twenty-two second grade teachers held permanent teaching certificates; five teachers in the basal reader group and four teachers in the linguistic reader group. Seven teachers held college provisional teaching certificates; two in the basal reader group and five in the linguistic group. Two teachers, one in each of the treatment groups held three year standard certificates. Three teachers held two year standard certificates, two teachers in the basal reader group and one in the linguistic group. One teacher in the basal reader group was uncertified. Seven of the twenty-two third grade teachers had permanent certification: four teachers in the basal reader treatment and three in the linguistic treatment. Eleven teachers held college provisional certificates: five teachers in the basal reader group and six in the linguistic group. Four teachers had Standard Normal School certificates: two teachers in each treatment.

Master's degrees or master's degrees plus additional credits were held by four of the second-grade teachers, all of whom were in the basal reader treatment. Seven teachers had obtained additional credits beyond a Bachelor's degree; four taught in the basal reader group and three in the linguistic group. Bachelor's degrees were held by six teachers in the linguistic treatment. Seven teachers had less than a bachelor's degree: three in the basal reader group and four in the linguistic group.

Fourteen of the third-grade teachers had obtained a bachelor's degree plus additional credits: eight of these teachers were in the basal reader group and six were in the linguistic group. Bachelor's degrees were held by five teachers: two in the basal reader group and three in the linguistic group. Three teachers held less than bachelor's degrees: one teacher in the basal reader group and two teachers in the linguistic group.

The Pupils

At the beginning of the first grade in September 1964, the twenty-four classes participating in the experiment included 747 pupils, of whom 376 were taught by the linguistic approach and 371 were taught by the basal reader approach. At the end of first grade, complete data were available for 674 pupils, of whom 347 were in the linguistic treatment and 327 were in the basal reader treatment. Data for 73 first-grade pupils were not included in the final analysis because of pupil absence at the time when tests were administered, family transiency, transfer out of experimental classes for regrouping purposes, and a variety of additional reasons.

Of the 674 pupils who completed the first-grade reading study, 484 remained through the second year of the study. Each of the pupils continued with the same instructional program he had had during the first year. Of this number, 262 pupils were taught by the linguistic approach and 222 were taught by the basal reader approach. There were several reasons for pupil loss during the second year. In addition to the reasons for attrition cited for the first year, principals withdrew two classes from the experiment during the second year, one from each of the treatment groups. New elementary schools were opened in one of the more recently developed neighborhoods to relieve overcrowding in existing schools. As a result some of the pupils in the experiment were transferred to new schools closer to their homes.

At the end of grade three, complete data were available for 423 pupils, of whom 236 were in the linguistic treatment and 187 were in the basal reader treatment. The attrition during the third year of the study was less than the attrition during the second year and was primarily due to transiency and mobility common in large urban centers. The greatest loss occurred among pupils in the basal reader group.

Table 2 shows the number of pupils completing each of the three years of the experiment and the number of pupils lost from year to year. The numbers are shown for treatment, ability score level and sex.

The class size during the last two years of the study ranged from 16-33 pupils in the basal reader group and from 25 -40 in the linguistic group. While attempts were made each year to retain the original first grade class as an intact group, this became impractical for administrative purposes in certain schools with a limited number of classes at each grade level. In several instances it was necessary during the second and third years to add children to classes who had not been part of the original experiment in order to equalize class size within the given school. While this procedure made instruction difficult, particularly in the linguistic classes where a unique method was employed, teachers made every effort to avoid contamination of approaches.

As mentioned previously, the assignment of

Table 2

NUMBER OF PUPILS COMPLETING FIRST, SECOND, AND THIRD YEAR AND PUPIL LOSS

Group	No. Completing 1st Year	No. Completing 2nd Year	No. Completing 3rd Year	Loss Between 1st, 2nd Year	Loss Between 2nd, 3rd Year	Total Loss
High Basal Boys	51	35	33	16	2	18
High Basal Girls	67	55	50	12	5	17
High Ling. Boys	66	55	52	11	3	14
High Ling. Girls	61	54	49	7	5	12
Average Basal Boys	69	39	28	30	11	41
Average Basal Girls	58	32	29	26	3	29
Average Ling. Boys	64	53	45	11	8	19
Average Ling. Girls	55	38	35	17	3	20
Low Basal Boys	46	34	28	12	6	18
Low Basal Girls	36	27	19	9	8	17
Low Ling. Boys	49	27	25	22	2	24
Low Ling. Girls	52	35	30	17	5	22
Total						
Basal	327	222	187	105	35	140
Linguistic	347	262	236	85	26	111

classes to ability score levels was based upon the results of the Philadelphia Verbal Ability Test (PVA) which was administered during the kindergarten year preceding the experiment in 1964. The mean PVA I.Q.'s for classes grouped by treatments and ability score levels are shown in Table 3. The analysis of variance showed that differences between mean I.Q.'s for treatments were not significant; as expected, there were significant differences in mean I.Q.'s among ability score levels.

Teaching Approaches and Materials

The major objective of the three year investigation was to compare the reading achievement at the end of each of the first three grades of pupils (at above average, average, and below average ability score levels) who were initially taught two different methods of reading instruction. The two reading approaches used as independent variables were the Fries linguistic approach and the Scott, Foresman basal reader approach. The approaches and materials used in the experiment are described below.

The Linguistic Approach

The Fries linguistic approach to beginning reading instruction is described in detail in Linguistics and Reading (1963), and incorporated in A Basic Reading Series Developed upon Linguistic Principles (C. C. Fries, A. C. Fries, Wilson, and Rudolph, 1963-65). The Basic Reading Series includes an alphabet book, eight readers and practice books, and a teachers' manual.*

The readers and practice books of the linguistic series were the basic instructional materials used in what Fries refers to as the "transfer stage" or the first stage of learning to read.

> The first stage in learning the reading process is the "transfer stage." It is the period during which the child is learning to transfer from the auditory signs for language signals, which he has already learned, to a set of visual signs for the same signals. This process of transfer is not the learning of the language code or of a new language code; it is not the learning of a new or different set of language signals.

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*Samples of this series are on file in the U. S. Office of Education.

Table 3

MEAN IQ'S FOR CLASSES ON PHILADELPHIA VERBAL ABILITY TEST (PVA)

Ability Score Level	Treatments					
		Basal Reader Approach			Linguistic Approach	
		School			School	
High		A	121.6		M	122.9
		B	126.5		N	126.2
		C	126.1		O	119.3
		D	126.8		P	123.1
	N = 118	Cell Mean	125.2	N = 127	Cell Mean	122.9
Average		E	109.7		Q	96.1
		F	97.8		R	98.1
		G	104.2		S	99.4
		H	94.5		T	99.7
	N = 127	Cell Mean	101.6	N = 119	Cell Mean	98.3
Low		I	83.5		U	80.4
		J	90.0		V	84.4
		K	80.0		W	83.8
		L	98.1		X	84.8
	N = 82	Cell Mean	87.9	N = 101	Cell Mean	83.3
Total	N = 327	Treatment Mean	106.68	Total N = 347	Treatment Mean	102.94

> It is not the learning of new "words," or of new grammatical structures, or of new meanings. These are all matters of the language signals which he has on the whole already learned so well that he is not conscious of their use. This first stage is complete when within his narrow linguistic experience the child can respond rapidly and accurately to the visual patterns that represent the language signals in this limited field, as he does to the auditory patterns that they replace (Fries, 1963, p. 132).

The following twelve principles are basic to an understanding of the linguistic approach (Fries, Wilson, and Rudolph, 1966):

1. Learning to read begins with and builds upon the oral language "control" already achieved by the pupil--his mastery of the language that he uses when he speaks and that he understands when it is spoken. Oral language activities that are appropriate to the environmental factors and to the maturity of the group and that provide for grwoth at each level are thus regarded as a vital part of the approach.

2. The vocabulary and the grammatical structures presented in the reading materials must be within the oral experience of the child and must keep pace with the widening of that experience. The reading matter in the program must at all stages be such as to permit the pupil to identify the written words as the same words he knows very well when he hears them spoken.

3. The vocabulary presented must lead gradually to a thorough assimilation of the three major patterns that characterize the great body of English spellings. The spelling-pattern approach is built upon, and takes advantage of, the very high degree of regularity that exists, despite all assertions to the contrary, in the spelling of present-day English.

4. Emphasis on minimum contrasts in words that are otherwise similar in spelling

(*mat*-*fat*; *mat*-*man*; *mat*-*met*; *mat*-*mate*; etc.), *if developed in carefully ordered succession*, is the most effective means of teaching word recognition. Through early and continued training in perceiving minimum contrasts, the pupil will develop the habit of paying close attention to the words he is reading and will in time attain a great degree of proficiency in word recognition.

5. Instant recognition and discrimination of the letters of the alphabet in any sequence whatsoever is an essential preparation for learning to read.

6. The introduction of a limited number of high-frequency words (sight words) that do not conform to the spelling patterns being developed at the time is vital to provide reading material that has normal sentence patterns. However, since the main emphasis should be on the "regular" spelling patterns being presented, the written form of such sight words should not be given special attention.

7. Knowledge of the major spelling patterns (and of inflectional endings) can be immediately applied by the pupil to the reading of innumerable other words formed in accordance with or incorporating or resembling those basic patterns. . . .

8. In the teaching of reading, there must be complete meaning responses by the child, not only to particular words but to those words in full sentences, and to those sentences in sequences of sentences. It is for this reason that the use of nonsense words should be avoided. Furthermore, because cumulative meaning is essential, the teaching procedures throughout the stories must be such as to take account of the different backgrounds and levels of maturity of the pupils. . . .

9. A continuing, known environment in the stories--representing ordinary settings

and realistic experiences and characters--keeps the beginning reader from having to struggle to understand unfamiliar or fantastic concepts at the same time that he is learning to do reading. . . .

10. In order to focus the pupils' attention upon the reading materials themselves, pictures must be excluded from the basic series. Experience has consistently demonstrated that (a) pictures constitute a distracting element in the process of learning to read, and (b) because pictures furnish clues to meaning, they lead the pupils to guess at words rather than to read them.

11. Early practice in writing (first sentences, then stories), if guided so as to utilize the patterns and the sight words presented in the reading text, reinforces the child's grasp of the major spelling patterns and of the grammatical structures of standard English.

12. The teaching procedure must permit what amounts to a daily evaluation of reading progress, and the program must make provision for the testing and further development of each pupil's specific abilities to interpret, recall, organize, draw conclusions, and write independently.

As the children using the linguistic reader series completed the eight readers, practice books, and supplementary books, they advanced to the appropriate instructional reading level of selected basal readers and other books. Pupil instructional levels were determined by administration of informal reading inventories based upon the content of the readers to be used. The instructional program in reading followed that outlined in two publications issued by the School District of Philadelphia for the guidance of teachers in the elementary schools: "The Continuous Progress Primary Description of Levels in Reading and Arithmetic -- Levels 1-4" (April 1966) and "Language Arts Supplement to Suggestions for the Teaching of Reading, the Developmental Reading Program in the Elementary School" (1966).* None of the material for developing phonic skills as outlined in the publications was included in the instructional program.

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*Sample copies of these materials are on file in the U. S. Office of Education.

Needed instruction for developing word recognition skills followed the linguistic principles based upon spelling patterns as developed in the linguistic reading series.

The following basal readers and workbooks from the Reading for Meaning Series by McKee, et al. (Houghton, Mifflin, 1966) were used by pupils in the linguistic treatment after they completed materials in the linguistic reader series:

Looking Ahead (3^1)
Climbing Higher (3^2)
High Roads (4)
Sky Lines (5)

Workbooks accompanying these readers were used selectively for appropriate activities for developing comprehension and related skills. All pupils did not necessarily use all of the materials listed above. The materials used depended upon rate of progress of pupils within particular classes and the extent to which teachers were willing to place pupils at reading levels above the class grade. In addition to the materials mentioned above, pupils in each class were provided with sets of library books at appropriate reading levels for recreational reading.

The directed reading approach was used for the presentation and guidance of material in the readers, with silent reading preceding oral reading, and with questions presented to guide the silent reading and to check comprehension at the conclusion of the reading activity.

Some of the pupils in the linguistic treatment had completed all of the linguistic materials early in the second year and began their instructional program in the Houghton-Mifflin readers at that time. Other pupils did not complete the linguistic materials until well into the second year while still others did not complete the linguistic materials until the third year.

The Basal Reader Approach

The basal reader approach was taught using the readers, workbooks, and teacher's manuals of The New Basic Readers, Sixties edition (Robinson, et al.), published by Scott, Foresman and Company. The instructional program as described in each accompanying teacher's manual was followed in order to provide some control of the type of program being conducted.

The following basal reader materials were used during the second and third years of the study:

Friends Old and New (2^1)
More Friends Old and New (2^2)
Think-and-Do Book (2^1)
Think-and-Do Book (2^2)
The New What Next (Part I)
The New What Next (Part II)
Roads to Follow (3^1)
More Roads to Follow (3^2)
Think-and-Do Book (3^1)
Think-and-Do Book (3^2)
The New Tall Tales (Part I)
The New Tall Tales (Part II)
Ventures (4)
Vistas (4)
Wide Horizons (5)
First, Second, and Third Rolling Readers
Rolling Phonics, Consonants
Rolling Phonics, Vowels

All children in the basal reader group did not necessarily use all of the materials listed above. The number of readers and supplementary materials which each pupil completed depended upon the rate of progress of children within each class and the extent to which individual teachers permitted pupils to accelerate to reader levels above that of the class grade. In addition to the materials listed above, pupils were provided with selected library books for recreational reading.

The Scott, Foresman second and third year programs provide for continued sequential development of word recognition and comprehension skills. At these levels, emphasis is placed on phonic and structural analysis in developing techniques for attacking new words. Reading for meaning is emphasized through systematic development of various comprehension skills including organization, evaluation, and critical reading. The programs also include a variety of activities designed to promote appreciation of literature.

An important aspect of the basal reader approach is the readiness or preparatory activities which precede the first silent reading of the material. During this readiness period, the teacher discusses vocabulary and concepts that are involved in the story in order to help pupils relate appropriate experiential background and language structures to the words that they are asked to identify. This period is also used to provide provocative questions to guide the silent reading of pupils.

Supervision of Instruction

The instructional program in each treatment group was supervised by an experienced supervisor who was thoroughly familiar with the teaching procedures and materials for the particular approach. Each of the supervisors had years of experience as a classroom teacher as well as previous supervisory experience. Mrs. Mildred K. Rudolph, one of the authors of the linguistic approach, supervised the teachers in the linguistic approach; and Mrs. Anita Theil supervised teachers in the basal reader approach. Each supervisor attempted to visit each of her eleven classes approximately once every ten days to two weeks with approximately twenty visits to each teacher. In addition to guiding the use of the instructional materials and offering demonstration lessons, the supervisors attempted to make certain each teacher was adhering to the particular approach she was supposed to be using. The supervisor made certain that each teacher had appropriate materials to meet the range of instructional levels within each class.

In addition to the services of the supervisors, teachers in each treatment had access to professional consultants who were specialists in the particular reading approach. The consultant for the linguistic approach was Mrs. Rosemary G. Wilson, Assistant Director in Charge of Reading for the School District of Philadelphia, who was one of the authors of the instructional materials in the linguistic approach. The consultant for the basal reader group was Dr. Mary E. Coleman, Professor of Education at the University of Pennsylvania, whose specialization is the teaching of reading and language arts in the elementary school.

Prior to the initiation of the reading program in September, teachers in both treatment groups met with the project director, the two supervisors, and the two consultants, for an intensive one day workshop. After the project director presented the purposes and nature of the research project, the supervisors and consultants discussed the testing materials and testing procedures that would be used for initial and final testing. The testing materials themselves, however, were not made available until just prior to the actual testing period. The remainder of the workshop was devoted to a discussion and demonstration of the materials to be used and methods to be emphasized in each of the two instructional approaches.

After the instructional period had begun, the project director accompanied by one of the consultants visited each of the twenty-four classes. During these visits, the project director observed the reading sessions and offered suggestions or answered questions posed by the teacher. Following each visit, the project director, supervisor, and consultant, met with the teacher and principal to discuss the progress of the experimental research and to cope with any problems that may have arisen during the preceding experimental period.

The various members of the research project, including the director, supervisors, consultants, teachers, and principals communicated in personal conferences and by telephone as instructional or administrative problems arose.

Time Allotments

The publications of the Philadelphia Schools recommend the following weekly time allotments for the instructional program of pupils:

	Time in Minutes per Week	
	Second Year	Third Year
Language Arts		
Reading and Literature	475	400
Spelling, handwriting, written, and oral expression	150	150
Social Studies & Science	250	275

Testing Program

Prior to the initiation of the USOE First Grade Reading Study, the 27 project directors met to plan the pretesting and posttesting program to evaluate various aspects of reading readiness and achievement in reading and related language arts areas. The pretests, which consisted of three reading readiness tests and an intelligence test, were administered to all pupils in the two treatment groups during the last weeks of September 1964, the beginning of the first grade year.

The following pretests were administered by the classroom teacher with the assistance of another local school person or a member of the research staff: (1) the Murphy-Durrell Diagnostic Readiness Test; (2) the Metropolitan Readiness Test; (3) the Pintner-Cunningham Test of General Ability; (4) the Thurstone Test for Identical Forms; and (5) the Thurstone Test of Pattern Copying.

The 14 project directors involved in the USOE reading studies, in cooperation with the Coordinating Center at the University of Minnesota, planned the posttest batteries for the first- and second-grade studies. The Coordinating Center did not function during the third year of the study. The principal investigator of the present study decided to continue with the same criterion tests used in the first-grade investigation in order to provide for continuity of measurement of selected achievement characteristics.

In May 1966, at the end of the second-grade study, following an experimental period of 161 days, the Stanford Achievement Test, Primary II Battery, Form W, was administered to all pupils in the two treatment groups. In addition, the Gilmore Oral Reading Test, the Gates Word Pronunciation Test, and the Fry Phonetically Regular Words Oral Reading Test were administered to randomly drawn subsamples from each ability score level of each treatment group. A writing sample was obtained from all pupils, but was scored and analyzed only for the pupils in the subsample.

At the completion of the third-grade reading study, after an experimental period of 161 days, in May 1967, the Stanford Achievement Test, Primary II Battery, Form X and the Stanford Achievement Test, Intermediate I, Partial Battery, Form X, were administered to all pupils in the two treatment groups. The two tests were administered to all pupils because of the analysis of the results of the Stanford Primary II test at the end of second grade indicated that scores for the low ability groups in both treatments were concentrated at the low-middle range of the scale, while scores for the high ability groups tended to concentrate at the top of the scale. Thus, it was felt that the Stanford Intermediate I Battery would be difficult for the low ability group, while the Primary II Battery would be too easy for the high ability group.

Two oral reading measures, the Gilmore Oral Reading Test and the Gates Word Pronunciation Test were administered to the subsamples previously drawn at random for the first year study with additional pupils drawn randomly from each of the two treatment groups. A writing sample was also obtained from all pupils in the two treatment groups, but was scored and analyzed only for the pupils in the subsample.

All of the Stanford Reading Tests and the writing samples were administered by the classroom teachers with the assistance of local school personnel or research staff members. The oral reading tests and word lists were administered by the project supervisors for the respective treatments. All tests and writing samples were scored by the project staff.

Treatment of the Data

Test scores and other pertinent data were punched on IBM cards and the data analyzed on a computer. Raw-score means, standard deviations, standard errors of the mean, and correlation coefficients were computed. The correlation matrix was examined to determine the degree of relationship between pretest variables and criterion variables. The significance of the mean score differences of the pretest variables for treatments, ability score levels, and sexes was tested by analysis of variance in a 2 x 3 x 2 factorial design: Treatment by Ability Score Level by Sex. Data from administration of the criterion measures were analyzed using an analogous analysis of covariance design, with relevant variables controlled statistically.

The Newman-Keuls sequential range test was used to compare treatment means at each of the separate ability score levels (Winer, 1962).

Selection of Class Mean or Pupil Score as the Statistical Unit

The choice of an appropriate statistical unit for comparing differences between treatments for determining statistical significance is one of the most important decisions the researcher makes in planning his statistical analysis of the data. Some researchers have used the class mean as the statistical unit, while others have chosen to use the individual pupil score. The number of degrees of freedom used in the analysis depends upon whether the researcher selects the class mean or the individual pupil score. When class means are used as the statistical unit, the number of class means in the treatment group is used to determine the number of degrees of freedom. When individual pupil scores are used as the statistical unit, the number of pupils is used to determine the number of degree of freedom. The statistical unit chosen makes a considerable difference in the number of degrees of freedom available in the analysis. A difference between means that is significant when individual pupil scores are the statistical unit may turn out not to be significant when class means are used.

For the analysis of data from the first-grade phase of this study reported previously (1966[a], 1966[b]) only individual pupil scores were used as the statistical unit of analysis. This statistic was used because plans for the testing of differences between treatments called for the use of several covariates to adjust posttest mean scores by analysis of covariance procedures. It was suggested that if class means were used as the basic unit, there would be an insufficient number of degrees of freedom available for the covariance analysis. The statistical consultant for the project recommended that individual pupil scores be used instead. This procedure was followed in the first-grade study and in the preliminary analysis of the second-grade data as noted below.

When the data for the second-grade phase of the study were analyzed, it was decided to continue use of the individual pupil score as the statistical unit in order to provide continuity with the analysis made for the first-grade data. The preliminary report of the second-grade study (Schneyer, 1967) was therefore based upon pupil scores.

The data for the third grade phase of the study became available in 1967 and the issue of selecting the appropriate statistic of analysis was raised again. In an article dealing with critical evaluation of research, Glass and Robbins (1967) made a strong case for the use of class means as the proper statistical unit when intact classes were involved in the treatments:

> . . . when a treatment is applied to a group of subjects, instead of to each subject individually and independently, an appropriate analysis of the experiment used the means of the groups as raw data. In such instances, the legitimacy of the analysis on the scores of each individual is questionable since it gives the impression of far greater precision in the data than actually exists. The researcher should be guided by the following: the unit of analysis, i.e., the raw data upon which one counts up degrees of freedom must be the same as the experimental unit, i.e., the smallest subdivision of the total group of subjects which is randomly assigned to the experimental conditions and which is treated independently of other experimental units for the duration of the experiment. An appreciation of the importance of determining the legitimate experimental unit and having it coincide with the unit of statistical analysis is not widespread in educational research (p. 11).

This procedure is also recommended by Campbell and Stanley (p. 192, 1963).

Following a further discussion of the issues raised above, it was decided to compute two separate analyses of the data: (1) the major analysis to be made using class means as the statistical unit upon which conclusions of the study would be based; (2) and a second analysis using individual pupil scores as the statistical unit in order to provide continuity of data analysis for all three years of the study. This decision was made to permit comparability of results obtained from the other second- and third-grade USOE studies which, in the main, used class means as the statistical unit of analysis.

Since the analysis of the first- and second-grade data based upon individual pupil scores was already complete, the analysis for these two years was rerun using split-class means as the statistical unit, with separate means computed for boys and girls. Two separate analyses were made from the third-grade data.

The results of the analysis of the second-grade data based upon split-class means are presented in Chapter III, with data for the third grade reported in Chapter IV. Tables presenting data based upon split-class means for criterion measures used in the first-grade study are found in Appendix A. Tables showing the second-grade results for criterion measures based upon individual pupil scores are presented in Appendix D. Results of the analysis of third-grade data for criterion measures based on individual pupil scores are presented in Appendix G.

One further note concerning the analysis of data is in order. The above discussion pertains only to the analysis of data obtained from administration of the criterion measures to the total sample. The criterion measures administered to the randomly drawn subsamples were analyzed using individual scores in all instances for all three years of the study. This procedure was followed because of a rather small number of elements in each of the cells. These data are also reported in the appropriate places in Chapters III and IV.

CHAPTER III

ANALYSIS OF SECOND-GRADE DATA

This chapter presents the analysis of teacher and pupil data for the second-grade study. The data analysis for the third-grade study will be presented in Chapter IV. Specifically, the present chapter includes: (1) the analysis of data for teachers; (2) the analysis of data for pupils including pretests administered prior to the beginning of the first grade experiment as well as other pertinent data; (3) an examination of variables to determine their usefulness in adjusting the mean scores of the criterion measures; and (4) an analysis of the data for the criterion measures.

In the second-grade study, teacher data were obtained for age, total years of teaching experience, total years of teaching second grade, number of absences, and efficiency rating.

To assess the status of pupils in the two treatment groups in terms of potential for reading achievement prior to the initiation of the first-grade study, a pretest battery consisting of two readiness tests and an intelligence test was administered to all pupils in the 24 classes. These data were recomputed for pupils remaining in the second-grade study.

Following the completion of the 161 day second-grade experimental period, in May of 1966, a silent reading test was administered to all pupils. Oral reading tests and word lists were individually administered to a random sample of pupils drawn from each of the two treatment groups. Finally, a writing sample was obtained and scored for pupils in the random sample.

During the second grade, additional data for pupils were obtained for number of books read and a measure of pupil's eagerness for reading.

Analysis of Predictor Variables for Teachers

The means and standard deviations for teacher data in the second-grade study, including age, total years of teaching experience, years of second grade teaching experience, number of absences, and performance rating, are shown in Table 4; the analysis of variance F ratios are shown in Table 5.

Teacher Age

The ages of the teachers in the basal reader group ranged from 23 to 60 years with a mean of 45.09, the ages of the teachers in the linguistic group ranged from 23 to 55 years with a mean of 33.16. The difference between means for age of teachers in the two treatment groups was significant at the .05 level, with the teachers in the basal reader group having the higher mean age. The differences between means for teachers' age among ability score levels were significant at the .05 level, with the older teachers tending to be in classes at the high ability score level. In the basal reader group, the younger teachers tended to be in classes at the low ability score level, while in the linguistic group, the younger teachers tended to be in classes at the average ability score level.

Total Teaching Experience

The teachers varied widely in total number of years of teaching experience. In the basal reader group, the range was from 1 to 35 years, with a mean of 16.81 years; in the linguistic group the range was from 0 to 13 years, with a mean of 5.50 years. The difference between the means for the two treatments was significant at the .01 level, with the more experienced teachers in the basal reader treatment. The differences between means for years of total teaching experience among ability score levels was significant at the .01 level with the treatment and ability score level interaction also significant at the .01 level. In the basal reader group, the more experienced teachers tended to be associated with classes at the high ability score level. More inexperienced teachers tended to be with classes at the low ability score level. In the linguistic group, the more experienced teachers also tended to be with classes at the high ability score level, while the less experienced teachers were associated with classes at the average ability score level.

Second-Grade Teaching Experience

There was also a wide variation in the number of years of second-grade teaching experience. The mean number of years of second-grade teaching experience for the teachers in the basal reader group was 6.0 with a

Table 4

MEANS, AND STANDARD DEVIATIONS FOR AGE, EXPERIENCE, ABSENCE AND RATING OF SECOND-GRADE TEACHERS

	Basal Reader Approach			Linguistic Approach		
	Ability Score Level			Ability Score Level		
	High	Average	Low	High	Average	Low
			Means			
Age	56.25	44.33	34.50	41.75	24.25	33.00
Total Teach. Exp.	30.50	13.00	6.00	8.50	1.00	7.67
2nd Grade Teach. Exp.	12.75	1.67	2.50	3.00	1.00	3.00
Absence	4.00	5.33	5.75	3.25	11.75	9.00
Rating	9.00	8.00	8.25	8.00	8.00	6.00
			Standard Deviations			
Age	27.5	13.7	15.8	14.9	1.26	7.81
Total Teach. Exp.	6.14	10.8	6.88	4.65	0.82	3.06
2nd Grade Teach. Exp.	3.40	0.58	2.65	2.58	0.82	1.00
Absence	2.16	1.53	4.79	2.87	3.59	3.46
Rating	0.82	2.00	1.26	1.63	1.83	1.00

Table 5

ANALYSIS OF VARIANCE F RATIOS FOR TEACHER AGE, TOTAL TEACHING EXPERIENCE, 2nd GRADE TEACHING EXPERIENCE, TEACHER ABSENCE, AND TEACHER RATING

Source of Variation	df	F Ratios				
		Teacher Age	Total Teach. Exp.	2nd Grade Tchg. Exp.	Teacher Absence	Teacher Rating
Treatment (T)	1,18	7.48*	21.72**	14.93**	5.40*	3.87
Ability Score Level (A)	2,18	5.59*	13.17**	21.00**	5.36*	2.13
T x A	2,18	1.97	8.91**	13.98**	2.81	1.40

*Significant at .05 level.

**Significant at .01 level.

range from 0 to 17 years; in the linguistic group the mean was 2.27 years with a range from 0 to 6 years. The difference between treatment means was significant at the .01 level, with the more experienced teachers again found in the basal reader classes. The differences between means at ability score levels were significant at the .01 level, with a treatment by level interaction, significant at the .01 level. In the basal reader group, the more experienced teachers again tended to be found in classes at the high ability score level, with the least experienced teachers at the average ability score level. In the linguistic group the means in the high and average ability score levels were identical. The least experienced teachers were in classes at the average ability score level.

Teacher Absence

There were significant differences at the .05 level between the mean number of absences for teachers in the two treatment groups, with the teachers in the linguistic treatment having the greater number of absences. Mean differences among the ability score levels were also significant at the .05 level. The least amount of absence occurred among teachers in the high ability score classes in both treatments. The greatest amount of absence occurred among teachers in the low ability score classes in the basal reader group, and among teachers in the average ability score classes in the linguistic group.

Teacher Rating

The teachers were rated on a five-point scale in which a rating of 5 was the highest possible rating and a rating of 1 was the lowest. Each teacher was rated by each of two raters who evaluated teacher efficiency independently. A staff member from the Curriculum Office of the Philadelphia schools and the principal investigator of this project were the two raters. The rating assigned to each teacher was the sum of the two ratings.

The difference between the mean ratings for teachers in the two treatment groups was not significant, nor were the differences among means at the three ability score levels significant.

Analysis of Predictor Variables for Pupils

Pupil data for reading readiness, intelligence, attendance, interest in reading, and extent of independent reading, are reported below.

Reading Readiness

The Metropolitan Readiness Test and the Murphy-Durrell Diagnostic Readiness Test were administered to all pupils in September 1964 at the beginning of grade 1. The Metropolitan test consists of six subtests designed to measure knowledge of word meaning, listening ability, visual matching ability, knowledge of the alphabet, number knowledge, and copying ability. A total score was also provided.

Correlations between each subtest score and total scores were high. Therefore, only the data for total readiness scores were analyzed for pupils studied in grade 2. The raw-score means and standard deviations for the second-grade pupils on the Metropolitan test total readiness scores are reported in Table 6;analysis of variance F ratios are shown in Table 7.

The basal reader group had the higher mean total readiness scores. The differences were significant at the .05 level. There were wide differences among total score means for the ability score levels, with the pupils at the high ability score level having the higher scores and the pupils at the low ability score level having the lower mean scores. These differences were significant at the .01 level.

No significant differences between the total score means for boys and girls were found. None of the interactions was significant.

The Murphy-Durrell Diagnostic Readiness Test contains subtests to measure the ability to hear sound in words (Phonemes), knowledge of letter names (Letter Names), and ability to learn and recall word forms (Learning Rate).

Differences among means for ability score levels in first grade were also significant at the .01 level, in the expected direction. There were no significant differences for sex, and none of the interactions was significant. Interaction between treatment and ability score level was significant at the .05 level only for the Learning Rate subtest.

Table 6

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR METROPOLITAN READINESS TEST, TOTAL SCORE, GRADE 2[a]

(Split-Class Mean as Unit)

Group	Means	Standard Deviations[b]
High Basal Boys	71.93	8.78
High Linguistic Boys	68.63	5.83
High Basal Girls	71.54	3.81
High Linguistic Girls	67.09	3.14
Average Basal Boys	48.30	5.05
Average Linguistic Boys	46.65	4.17
Average Basal Girls	49.11	5.93
Average Linguistic Girls	40.84	4.36
Low Basal Boys	25.91	6.52
Low Linguistic Boys	25.45	1.26
Low Basal Girls	28.42	7.35
Low Linguistic Girls	25.75	1.84
Total Treatment[b]		
Basal	49.25	
Linguistic	46.84	

[a] Administered as pretest at the beginning of grade 1, September 1964.

[b] Standard deviations for total treatments were not available.

Table 7

ANALYSIS OF VARIANCE F RATIOS FOR METROPOLITAN READINESS TEST TOTAL SCORE, GRADE 2[a]
(Split-Class Mean as Unit)

Source of Variation	df	F Ratios
Treatment (T)	1,32	6.29*
Ability Score Level (A)	2,32	242.92**
Sex (S)	1,32	.00
T x A	2,32	.86
T x S	1,32	.35
A x S	2,32	.24
T x A x S	2,32	.02

*Significant at .05 level.

**Significant at .01 level.

[a] Administered as a pretest at the beginning of grade 1, September 1964.

The raw-score means and standard deviations on the Murphy-Durrell tests for pupils continuing in second grade are presented in Table 8; the analysis of variance F ratios are shown in Table 9.

Pupils in the basal reader treatment had significantly higher mean scores on the Phonemes and Letter Names subtests. These differences were significant at the .01 level. Differences among the means for ability score levels continued to be significant at the .01 level, and in the expected direction. There were no significant differences between mean scores for sex, and the only significant interaction was between treatment and ability score levels on the Letter Names subtest.

Intelligence

The Pintner-Cunningham Primary Test of General Ability was the intelligence test selected by the project directors for administration at the beginning of grade 1.

Table 10 presents the raw-score means and standard deviations for pupils in the second-grade study. Analysis of variance results are shown in Table 11.

The overall treatment means for the two groups were almost identical, and the difference between them was not significant. There were large differences, however, among the three ability score levels. These differences were significant at the .01 level, and in the expected direction. There were no significant differences between the means for boys and girls, and none of the interactions was significant.

Pupil Absence

The number of sessions each pupil was absent was obtained from school records. The means and standard deviations for pupil absence for treatments, ability score levels and sexes are shown in Table 12; analysis of variance F ratios are presented in Table 13.

There were no significant differences between treatments, among ability score levels, or between sexes. None of the interactions was significant.

Table 8

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR MURPHY DURRELL DIAGNOSTIC READINESS TEST

GRADE 2[a]

(Split-Class Mean as Unit)

Group	Phonemes	Letter Names	Learning Rate
		Means	
High Basal Boys	32.34	45.40	10.60
High Ling. Boys	26.37	42.92	11.72
High Basal Girls	35.46	47.17	12.50
High Ling. Girls	29.52	42.88	10.89
Ave. Basal Boys	17.41	32.12	9.85
Ave. Ling. Boys	13.80	25.00	8.04
Ave. Basal Girls	19.85	32.14	9.06
Ave. Ling. Girls	13.87	26.27	7.85
Low Basal Boys	6.76	13.14	6.20
Low. Ling. Boys	5.41	15.03	7.25
Low Basal Girls	8.46	14.02	6.13
Low Ling. Girls	6.13	13.12	6.98
Total Treatment			
Basal	20.17	30.53	9.02
Linguistic	16.77	28.76	8.94
	Standard Deviations[b]		
High Basal Boys	3.74	4.02	3.03
High Ling. Boys	7.37	3.44	1.36
High Basal Girls	2.36	0.76	1.60
High Ling. Girls	7.79	3.15	1.26
Ave. Basal Boys	1.54	2.21	1.18
Ave. Ling. Boys	3.51	1.74	1.03
Ave. Basal Girls	3.94	3.27	0.95
Ave. Ling. Girls	4.35	4.37	1.06
Low Basal Boys	2.04	5.30	2.90
Low.Ling. Boys	2.33	2.40	1.56
Low Basal Girls	4.80	3.76	1.81
Low Ling. Girls	1.54	1.64	2.05
Total Treatment[b]			
Basal			
Linguistic			

[a] Administered as a pretest at the beginning of grade 1, September 1964.

[b] Standard deviations for total treatments were not avilable.

Table 9

ANALYSIS OF VARIANCE F RATIOS FOR MURPHY-DURRELL DIAGNOSTIC READINESS TEST, GRADE 2[a]
(Split-Class Mean as Unit)

Source of Variation	df	F Ratios for Murphy-Durrell Subtests Phonemes	Letter Names	Learning Rate
Treatment (T)	1,32	10.14**	9.63**	.24
Ability Score Level (A)	2,32	113.55**	319.68**	27.36**
Sex (S)	1,32	2.00	.20	.00
T x A	2,32	.83	3.78*	1.58
T x S	1,32	.15	.32	.64
A x S	2,32	.25	.13	.29
T x A x S	2,32	.07	.35	.87

*Significant at .05 level.

**Significant at .01 level.

[a] Administered as a pretest at the beginning of grade 1, September 1964.

Table 10

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR PINTNER-CUNNINGHAM PRIMARY TEST, GRADE 2[a]

(Split-Class Mean as Unit)

Group	Means	Standard Deviations[b]
High Basal Boys	40.36	6.95
High Ling. Boys	40.67	3.22
High Basal Girls	43.11	0.74
High Ling. Girls	41.34	0.73
Ave. Basal Boys	29.25	3.80
Ave. Ling. Boys	28.27	3.83
Ave. Basal Girls	33.05	6.30
Ave. Ling. Girls	27.31	2.45
Low Basal Boys	16.28	2.57
Low Ling. Boys	17.72	2.36
Low Basal Girls	18.87	2.70
Low Ling. Girls	19.15	2.94
Total Treatment[b]		
Basal	30.06	
Linguistic	30.05	

[a] Administered as a pretest at the beginning of grade 1, September 1964.

[b] Standard deviations for total treatments were not available.

Table 11

ANALYSIS OF VARIANCE F RATIOS FOR PINTNER-CUNNINGHAM PRIMARY TEST RAW SCORES, GRADE 2[a]

(Split-Class Mean as Unit)

Source of Variation	df	F Ratios
Treatment (T)	1,32	.93
Ability Score Level (A)	2,32	156.83**
Sex (S)	1,32	2.24
T x A	2,32	1.19
T x S	1,32	1.44
A x S	2,32	.07
T x A x S	2,32	.23

*Significant at .05 level.

**Significant at .01 level.

[a] Administered as pretest at the beginning of grade 1, September 1964.

Table 12

MEANS AND STANDARD DEVIATIONS FOR PUPIL ABSENCE IN GRADE 2
(Split-Class Mean as Unit)

Group	Means	Standard Deviations[a]
High Basal Boys	11.51	2.16
High Ling. Boys	11.58	3.86
High Basal Girls	11.99	2.06
High Ling. Girls	12.31	3.06
Ave. Basal Boys	9.30	1.58
Ave. Ling. Boys	9.67	3.41
Ave. Basal Girls	11.30	2.49
Ave. Ling. Girls	9.85	3.87
Low Basal Boys	12.46	5.01
Low Ling. Boys	7.95	2.50
Low Basal Girls	12.98	3.46
Low Ling. Girls	12.81	3.64
Total Treatment[a]		
Basal	11.71	
Linguistic	10.72	

[a] Standard deviations for total treatments were not available.

Table 13

ANALYSIS OF VARIANCE F RATIOS FOR ATTENDANCE, GRADE 2
(Split-Class Mean as Unit)

Source of Variation	df	F Ratios
Treatment (T)	1,32	.70
Ability Score Level (A)	2,32	1.43
Sex (S)	1,32	1.67
T x A	2,32	.57
T x S	1,32	.20
A x S	2,32	.30
T x A x S	2,32	.78

*Significant at .05 level.

**Significant at .01 level.

Pupil Interest in Reading as Rated by Teacher

In March, 1966, teachers were asked to rate each of their pupils according to their tendency to choose reading whenever they had a choice between reading and other activities. Teachers also rated pupils according to the maturity level of the reading material they normally selected. Each pupil was rated on a five-point scale in each of the two categories (Eagerness to Read and Maturity of Choices). A rating of five meant the child almost always chose to read (in category one) and that he tended to select books usually preferred by older children (in category two). A rating of three meant that a pupil chose to read about half the time and that his selection of books was similar to books generally preferred by his own grade group. A rating of one meant that pupils practically never chose to read and that books he selected were generally preferred by younger children.

The means and standard deviations for treatments, ability score levels, and sexes on the Eagerness to Read and Maturity of Choices scales are shown in Table 14. Analysis of variance F ratios are reported in Table 15.

There were no significant differences in mean ratings on either scale for pupils in the two treatment groups. Differences among ability score levels were significant at the .01 level on both the Eagerness scale and the Maturity scale. Pupils in the high ability score levels tended to have higher ratings on both scales. However, ratings for pupils in the average and low ability score levels were not always consistent on the Eagerness scale as shown by the significant treatment by ability score level interaction. Girls demonstrated greater eagerness to read than did boys in both treatments. The difference was significant at the .05 level.

Extent of Independent Reading

Teachers were asked, in March 1966, to tabulate the number of books completely read or partially read independently by each pupil. There may be some questions about the usefulness of these data. Records were kept only of the numbers of different books read, but judgments were not made about the quality of the differences in levels read or the differences in length of books read. For example, pupils at the high ability score levels tended to read longer books, while pupils at the lower ability score levels tended to read shorter books. These dif-

Table 14

MEANS AND STANDARD DEVIATIONS FOR EAGERNESS TO READ[a] AND MATURITY OF CHOICES[a], GRADE 2
(Split-Class Mean as Unit)

Group	Eagerness to Read[a]	Maturity of Choices[a]
	Means	
High Basal Boys	4.00	3.57
High Ling. Boys	3.38	3.39
High Basal Girls	4.49	3.79
High Ling. Girls	3.76	3.62
Ave. Basal Boys	3.06	2.59
Ave. Ling. Boys	3.13	2.78
Ave. Basal Girls	3.36	2.73
Ave. Ling. Girls	3.96	3.01
Low Basal Boys	2.60	1.90
Low Ling. Boys	2.51	2.97
Low Basal Girls	3.14	2.11
Low Ling. Girls	3.43	2.84
Total Treatment		
Basal	3.46	2.79
Linguistic	3.40	3.12
	Standard Deviations[b]	
High Basal Boys	0.21	1.05
High Ling. Boys	0.33	0.15
High Basal Girls	0.41	0.25
High Ling. Girls	0.59	0.33
Ave. Basal Boys	0.40	0.15
Ave. Ling. Boys	0.28	0.39
Ave. Basal Girls	0.12	0.64
Ave. Ling. Girls	0.56	0.60
Low Basal Boys	0.34	0.19
Low Ling. Boys	1.02	1.11
Low Basal Girls	1.05	0.75
Low Ling. Girls	0.39	0.26
Total Treatment[b]		
Basal		
Linguistic		

[a] Rated on 5 point scale, with 5 as the highest possible rating.

[b] Standard deviations for total treatments were not available.

Table 15

ANALYSIS OF VARIANCE F RATIOS FOR EAGERNESS TO READ AND MATURITY OF CHOICES, GRADE 2
(Split-Class Mean as Unit)

Source of Variation	df	F Ratios	
		Eagerness to Read	Maturity of Choices
Treatment (T)	1,32	.44	2.82
Ability Score Level (A)	2,32	12.37**	16.81**
Sex (S)	1,32	11.97**	.84
T x A	2,32	3.51*	3.22
T x S	1,32	.55	.05
A x S	2,32	.24	.08
T x A x S	2,32	.35	.13

*Significant at .05 level.

**Significant at .01 level.

ferences were not systematically evaluated.

The means and standard deviations for books completely read and for books partially read are shown in Table 16; the analysis of variance F ratios are presented in Table 17.

Pupils in the linguistic treatment read on their own a significantly greater number of books than did pupils in the basal reader group. The difference was significant at the .05 level. However, there were no significant differences between the treatments in the number of books partially read. Children in classes at the high ability score level read more books than did children in either of the other two ability score levels, with pupils in the low ability score level classes having completed the fewest number of books. Differences among means for ability score levels were significant at the .01 level. There were no significant differences among ability score levels for books partially read. There were no significant differences between boys and girls in the number of books completely read or partially read. None of the interactions was significant.

Selection of Covariates for Control of Relevant Predictor Variables, Grade 2

Each of the five criterion variables administered to the total sample in second grade was correlated with the predictor variables separately for the boys and girls within each group at each ability score level. These individual within-cell correlations are based upon N's ranging from 27 to 55. For each predictor variable, medians were computed of 60 separate correlations (1 correlation for each of 12 cells with 5 criterion variables).

The median within-cell correlations are presented in Table 18, along with a summary of analysis of variance F ratios for treatments. The data in this table were examined to determine the usefulness of the variables as covariates in the adjustment of mean scores on final outcome measures. The selection of covariates will be discussed below.

It was hoped that the original random assignment of teachers and classes to treatment groups in the first-grade study would balance the two method groups on variables that could affect performance on criterion variables.

Table 16

MEANS AND STANDARD DEVIATIONS FOR NUMBER OF BOOKS COMPLETELY READ AND NUMBER OF BOOKS PARTIALLY READ, GRADE 2
(Split-Class Means as Unit)

Group	Books Completely Read	Books Partially Read
	Means	
High Basal Boys	8.42	1.50
High Linguistic Boys	11.50	0.50
High Basal Girls	11.62	1.55
High Linguistic Girls	14.20	0.76
Average Basal Boys	4.63	1.13
Average Linguistic Boys	9.58	3.62
Average Basal Girls	4.53	1.44
Average Linguistic Girls	8.70	3.64
Low Basal Boys	1.87	0.21
Low Linguistic Boys	1.86	1.77
Low Basal Girls	2.64	0.61
Low Linguistic Girls	2.80	1.80
Total Treatment		
Basal	5.71	1.05
Linguistic	8.63	2.04
	Standard Deviations[a]	
High Basal Boys	1.16	1.67
High Linguistic Boys	5.82	0.47
High Basal Girls	1.62	1.75
High Linguistic Girls	6.22	0.69
Average Basal Boys	0.73	0.07
Average Linguistic Boys	3.63	3.68
Average Basal Girls	2.44	0.52
Average Linguistic Girls	4.62	5.44
Low Basal Boys	0.34	0.30
Low Linguistic Boys	1.64	1.96
Low Basal Girls	1.52	0.71
Low Linguistic Girls	0.74	1.57
Total Treatment[a]		
Basal		
Linguistic		

[a] Standard deviations for total treatments were not available.

Table 17

ANALYSIS OF VARIANCE F RATIOS FOR NUMBER OF BOOKS COMPLETELY READ AND NUMBER OF BOOKS PARTIALLY READ, GRADE 2
(Split-Class Means as Unit)

Source of Variation	df	F Ratios	
		Books Read Completely	Books Read Partially
Treatment (T)	1,32	6.07•	1.52
Ability Score Level (A)	2,32	27.77••	2.33
Sex (S)	1,32	1.33	.07
T x A	2,32	1.56	2.03
T x S	1,32	.03	.01
A x S	2,32	1.04	.00
T x A x S	2,32	.02	.02

•Significant at .05 level.

••Significant at .01 level.

Table 18

SUMMARY OF ANALYSIS OF VARIANCE F RATIOS BETWEEN TREATMENTS OF PREDICTOR VARIABLES AND MEDIAN WITHIN CELL CORRELATIONS BETWEEN EACH PREDICTOR AND FIVE CRITERION VARIABLES IN GRADE 2

Pretest Variable	Median Within Cell Correlation	Treatment Variance F Ratio
Maturity of Choices of Books Read	.44	2.82
Eagerness to Read	.40	0.44
Total Raw Score Metropolitan Readiness	.38	6.29*
Murphy-Durrell Letter Names	.36	9.63**
Total Raw Score Pintner-Cunningham	.33	0.93
Murphy-Durrell Phonemes	.31	10.14**
Number of Books Completely Read	.24	6.07*
Murphy-Durrell Learning Rate	.22	0.24
Teacher Rating	.02	3.87*
Number of Books Partially Read	-.02	1.52
Teacher Absence	-.02	5.40*
Teacher Age	-.02	7.48*
Years Teaching 2nd Grade	-.02	14.93**
Class Size	-.04	0.12
Pupil Absence	-.05	0.70
Total Years Teaching	-.08	21.72**

*Significant at .05 level.

**Significant at .01 level.

However, there were significant differences between the two treatment groups on several of the pupil pretest and teacher variables. It was therefore desirable to consider the adjustment of mean scores on the final outcome measures for the influences of these initial differences.

Variables were considered as covariates when the median correlation between the relevant variable and criterion measures was significant and/or there was a significant difference between means scores for treatments. The differences among ability score levels were not of as much interest since ability score levels were already controlled in the factorial design and the readiness variables were related to ability score level and would provide additional control when their effects were removed through analysis of covariance. Since only one of the variables (Eagerness to Read) produced any differences between boys and girls, sex differences were not considered in the selection of covariates.

On the basis of the criteria cited, six variables were selected as covariates: the three Murphy-Durrell subtest raw scores (Phonemes, Letter Names, and Learning Rate); the Metropolitan Readiness test total score, the Pintner-Cunningham total raw score, and numbers of books completely read by pupils on their own.

The method chosen for the purpose of controlling the effects of relevant variables on criterion measures was analysis of covariance in a 2 x 3 x 2 design: treatment by ability score level by sex. Split-class means (split on the basis of sex with separate means computed for girls and boys) were computed for each of the criterion measures. The effect of the predictor variables was controlled statistically by adjusting the split-class mean scores on the criterion measures. Adjusted mean differences represent the best estimate of pupil achievement when the influence of the six predictor variables has been controlled. Finally, the Newman-Keuls sequential range test was used for multiple comparisons of adjusted means (Winer, 1962).

Analysis of Criterion Measures for Total Sample

The assessment of final achievement in second grade at the conclusion of the experimental period in May 1966 was based upon the results of the Stanford

Achievement Test, Primary II Battery administered to all pupils in both treatments. This test consists of eight subtests of which five are related to language arts aspects of the curriculum and three are related to other curriculum areas. The language-arts-related subtests include: Word Meaning, Paragraph Meaning, Spelling, Word Study Skills, and Language. The remaining subtests measure Science and Social Studies Concepts, Arithmetic Computation, and Arithmetic Concepts. Only the results of the reading, spelling, and language subtests are discussed below, although data for all subtests are included in the table for comparison purposes.

The raw-score means, standard deviations, and analysis of variance F values for the second-grade test results are presented in Appendix B.

The basal reader group achieved significantly higher raw-score means on four of the five language arts-related subtests. Differences between treatment means were significant at the .01 level on subtests for Word Meaning and Word Study Skills, while differences on the subtests for Paragraph Meaning and Spelling were significant at the .05 level. There were no significant differences on the Language subtest.

As would be expected, there were significant differences (at the .01 level) among ability score levels, with the high ability score level achieving highest on all language arts-related subtests, and the low ability score level scoring the lowest. Among the five language arts-related subtests, the only significant difference between sexes occurred on the Language subtest. This difference was significant at the .05 level and favored the girls. There were significant treatment and ability score level interactions on four of the five language-related subtests. Interactions on the Word Study Skills and Language subtests were significant at the .01 level, and interactions on the Word Meaning and Paragraph Meaning subtests were significant at the .05 level. None of the other interactions was significant.

The raw-score means for all subtests were adjusted for initial differences on the six predictor variables by an analysis of covariance which controlled for the effects of the relevant variables. A summary of the analysis of covariance F ratios is presented in Table 19.

The results of the covariance analysis for each of the five language arts-related subtests on the Stan-

Table 19

ANALYSIS OF COVARIANCE, F RATIOS FOR STANFORD SUBTESTS, GRADE 2
(Split-Class Mean as Unit)

Source of Variation	Degrees of Freedom	Word[a] Meaning	Paragraph Meaning[a]	Spelling[a]	Word[a] Study	Language[a]	Science & Social Studies	Arithmetic Computations	Arithmetic Concepts
Treatment (T)	1,26	.86	3.63	6.68*	8.31**	1.92	6.46*	2.15	11.14**
Ability (A)	2,26	23.89**	23.54**	23.36**	7.19**	53.20**	16.93**	1.65	28.46**
Sex (S)	1,26	.04	.59	.90	.38	.18	20.27**	.50	5.98*
T x A	2,26	1.10	1.88	2.17	19.28**	5.33*	2.33	6.35**	4.86*
T x S	1,26	.19	1.42	.39	.54	2.57	.01	.00	.12
A x S	2,26	.08	.51	.21	.47	.26	6.54**	.17	.55
T x A x S	2,26	.98	.56	1.87	1.01	2.61	.42	.94	.17

*Significant at .05 level. **Significant at .01 level.

[a] Only the five language art-related subtests considered as criterion measures. The remaining subtests are included for comparison purposes only.

ford Achievement Test, Primary II Battery, adjusted for the influence of the six predictor variables, are presented separately below.

Tables presenting comparable data based on individual pupil scores as unit of statistical analysis are found in Appendix C.

Stanford Word Meaning Subtest

This is a 36 item multiple choice test, with items increasing in difficulty. It provides a measure of pupil ability to read a sentence and to select the appropriate word for completing the sentence.

The adjusted mean scores for treatments, sexes, and ability score levels are shown in Table 20. The adjusted means are graphed in Figure 1, to illustrate interactions for treatment and ability scores. Of the main effects, only the adjusted mean differences among ability score levels were significant. These differences were significant at the .01 level, with pupils at the high ability score level having the highest mean and pupils at the low ability score level having the lowest mean. There were no significant differences between the adjusted means for sexes. None of the interactions was significant as shown in Table 19.

Stanford Paragraph Meaning Subtest

There are sixty paragraphs graduated in difficulty, in this subtest, from each of which a word has been omitted. The pupil demonstrates his comprehension of the paragraph by selecting from among four possible answers the correct word for each omission. The subtest provides a functional measure of the pupil's ability to comprehend connected material at varying levels of comprehension difficulty.

The only significant difference in adjusted mean scores for main effects occurs among ability score levels. (See Table 21 and Figure 2). Pupils at the high ability score level achieved the highest adjusted mean while pupils in the low ability score level achieved the lowest mean. Differences were significant at the .01 level. None of the interactions was significant. (See Table 19).

Table 20

ADJUSTED MEANS FOR STANFORD WORD MEANING SUBTEST, GRADE 2

(Split-Class Mean as Unit)

Ability Score Level	Sex	Basal Reader Approach N (Split-Class Means)	Basal Reader Approach Means		Linguistic Approach Means	Linguistic Approach N (Split-Class Means)	Total Means	
High	Boys	4	21.64		22.36	4	22.00 ←	
	Girls	4	22.99		21.54	4	22.26	
	Cell Total	8	22.31	← NS →	21.95	8	22.13	
Average	Boys	3	13.91		12.00	4	12.81	
	Girls	3	14.28		12.12	4	13.04	
	Cell Total	6	14.09	← NS →	12.06	8	12.93	.01
Low	Boys	4	13.16		12.45	3	12.86	
	Girls	4	12.38		13.05	3	12.67	
	Cell Total	8	12.77	← NS →	12.75	6	12.76 ←	
Total	Boys	11	16.45		15.89	11	16.17 ←	NS
	Girls	11	16.76		15.80	11	16.28 ←	
Total Treatment		22	16.60	← NS →	15.84	22		

Significance levels corresponding to F's shown on Table 19 are indicated by arrows for selected comparisons.

Figure 1

ADJUSTED MEANS FOR STANFORD WORD MEANING SUBTEST, GRADE 2

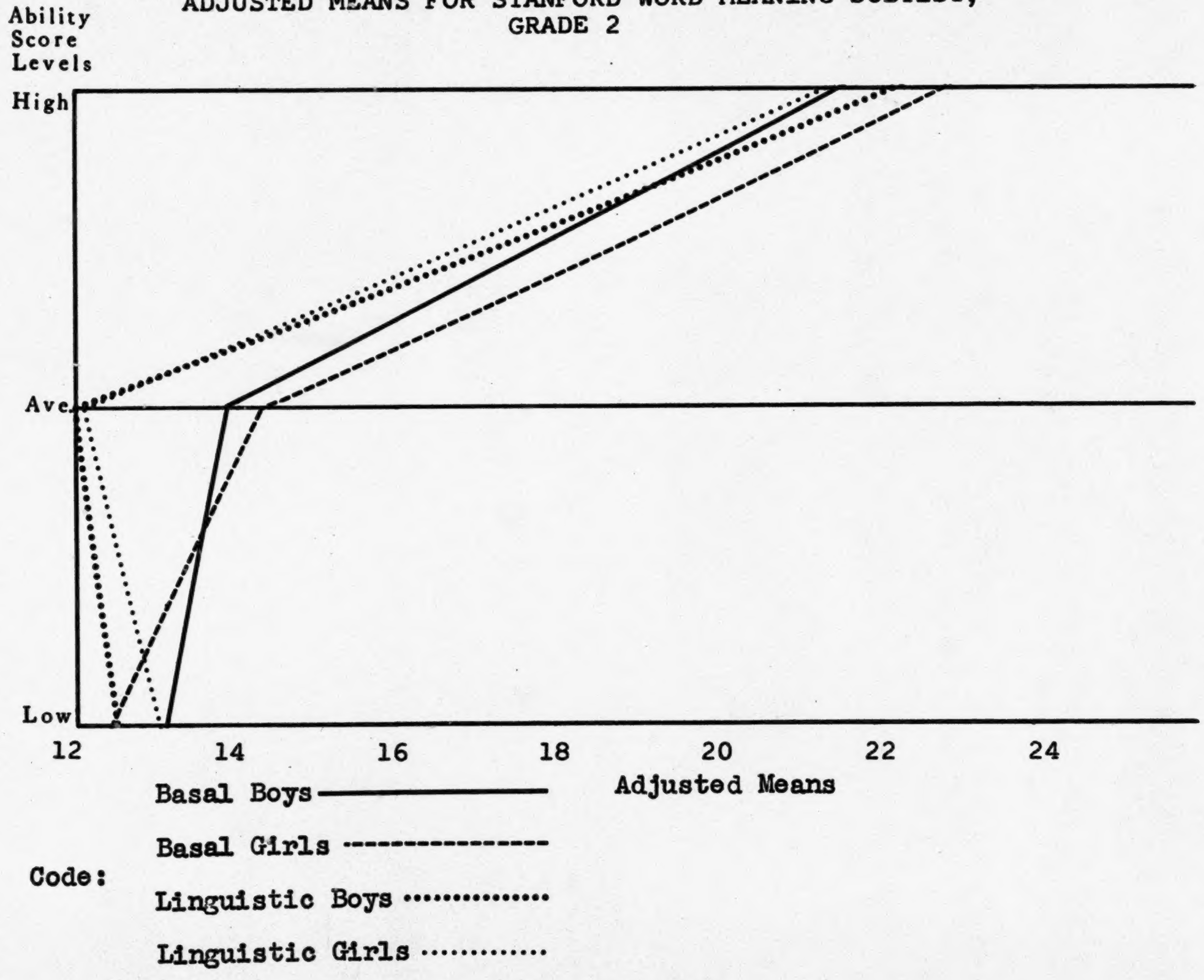


Table 21

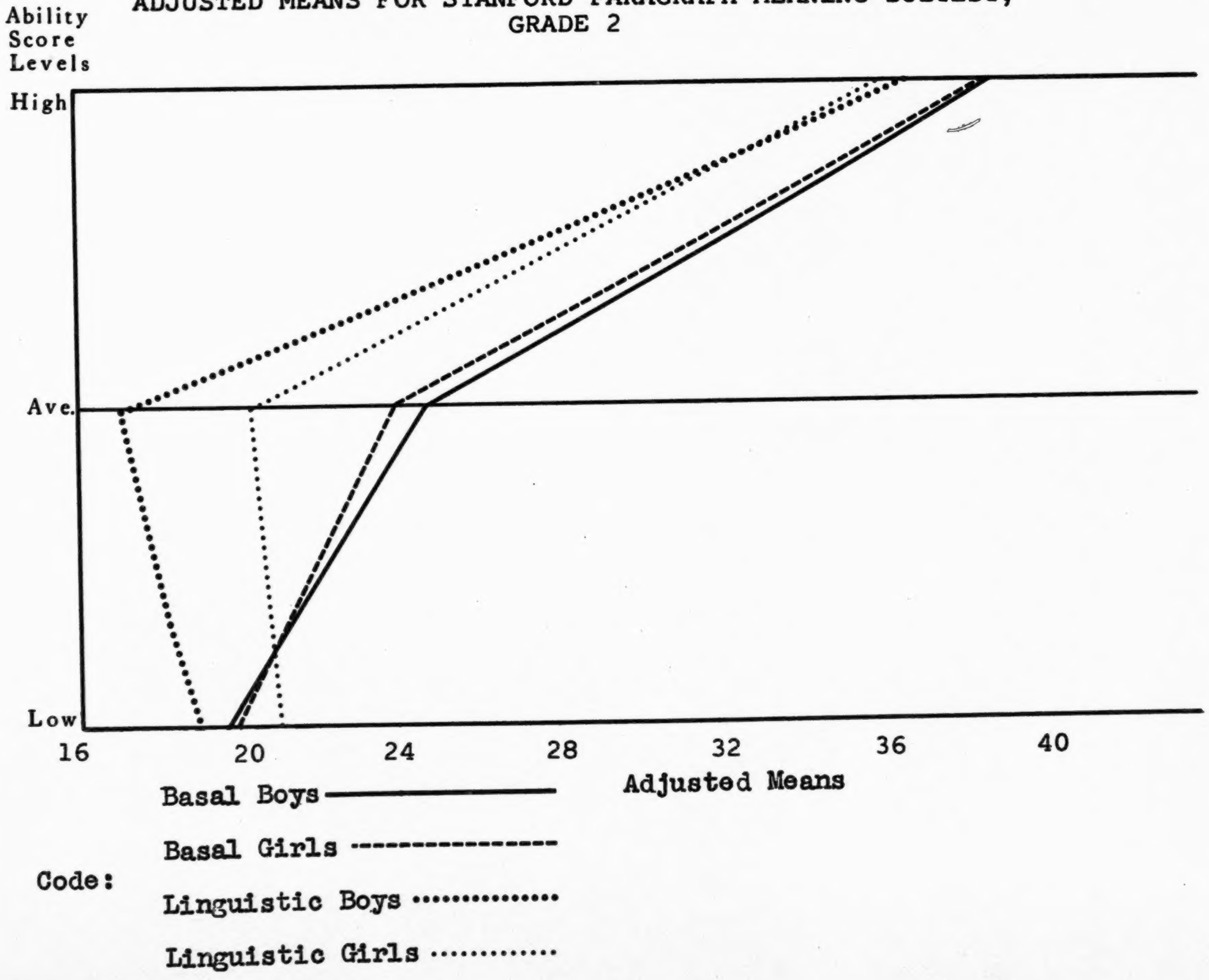
ADJUSTED MEANS FOR STANFORD PARAGRAPH MEANING, SUBTEST, GRADE 2
(Split-Class Mean as Unit)

Ability Score Level	Sex	Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
		N (Split-Class Means)	Means		Means	N (Split-Class Means)	Means	
High	Boys	4	39.11		36.80	4	37.95 ←	
	Girls	4	38.85		36.08	4	37.46	
	Cell Total	8	39.98	← NS →	36.44	8	37.71	
Average	Boys	3	24.57		17.02	4	20.26	
	Girls	3	23.66		20.45	4	21.77	
	Cell Total	6	24.11	← .05 →	18.69	8	21.01	.01
Low	Boys	4	19.74		17.88	3	18.94	
	Girls	4	19.90		20.96	3	20.35	
	Cell Total	8	19.82	← NS →	19.42	6	19.65 ←	
Total	Boys	11	28.10		24.45	11	26.27 ←	NS
	Girls	11	27.81		26.23	11	27.02 ←	
Total Treatment		22	27.96	← NS →	25.34	22		

Significance levels corresponding to F's shown in Table 19 are indicated by arrows for selected comparisons.

Figure 2

ADJUSTED MEANS FOR STANFORD PARAGRAPH MEANING SUBTEST, GRADE 2



Stanford Spelling Subtest

This subtest is a 30 item dictation-type spelling test. The choice of words was based upon frequency of use as shown by the writing of primary grade pupils.

Among the main effects, there were significant differences at the .05 level between adjusted means for treatments and at the .01 level among adjusted means for ability score levels (see Table 22 and Figure 3). There were reversals in the total means for ability score levels and among cell means at ability score levels within treatments. Differences between adjusted means for sexes were not significant.

Examination of the adjusted means in Table 22 reveals that the significant differences between treatment means favored the basal reader group. Among ability score levels, performance of pupils at the low ability score level exceeded performance of pupils at the average ability score. None of the interactions was significant, as shown in Table 19.

Stanford Word Study Skills

This is a 64 item multiple choice test divided into two parts. The first part is dictated by the teacher. She reads aloud a stimulus word. The pupils are required to discriminate the beginning or final sound of this word and to select a word thatbegins or ends the same from among four words read by the teacher. The last 34 items require the pupil to read a key word and find a word that has a similar designated sound in one of several other words.

The significant difference at the .01 level between adjusted means for treatments indicates that the basal reader group achieved higher performance in developing the kinds of phonic skills measured by this test (see Table 23 and Figure 4). Differences among adjusted means for ability score levels were also significant at the .01 level, with the pupils at the high ability score level having the highest means. There is a treatment by ability score level interaction (as shown in Table 19) that is significant at the .01 level. This results from the inconsistency of treatment differences at the various ability score levels. While high ability score pupils achieved the highest adjusted total means, the total means for the average and low ability score levels were reversed. The reversal in means at these two levels occurred in both

Table 22

ADJUSTED MEANS FOR STANFORD SPELLING
SUBTEST, GRADE 2
(Split-Class Mean as Unit)

Ability Score Level	Sex	Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
		N (Split-Class Means)	Means		Means	N (Split-Class Means)	Means	
High	Boys	4	16.79		14.68	4	15.73	←
	Girls	4	17.90		13.80	4	15.85	
	Cell Total	8	17.34	← .05 →	14.24	8	15.79	
Average	Boys	3	11.12		6.79	4	8.64	
	Girls	3	9.94		8.67	4	9.21	
	Cell Total	6	10.53	← .05 →	7.73	8	8.93	.01
Low	Boys	4	10.93		9.88	3	10.48	
	Girls	4	11.35		11.56	3	11.44	
	Cell Total	8	11.14	← NS →	10.72	6	10.96	←
Total	Boys	11	13.11		10.50	11	11.81	← NS
	Girls	11	13.35		11.32	11	12.34	←
Total Treatment		22	13.23	← .05 →	10.91	22		

Significance levels corresponding to F's shown on Table 19 are indicated by arrows for selected comparisons.

Figure 3

ADJUSTED MEANS FOR STANFORD SPELLING SUBTEST,
GRADE 2

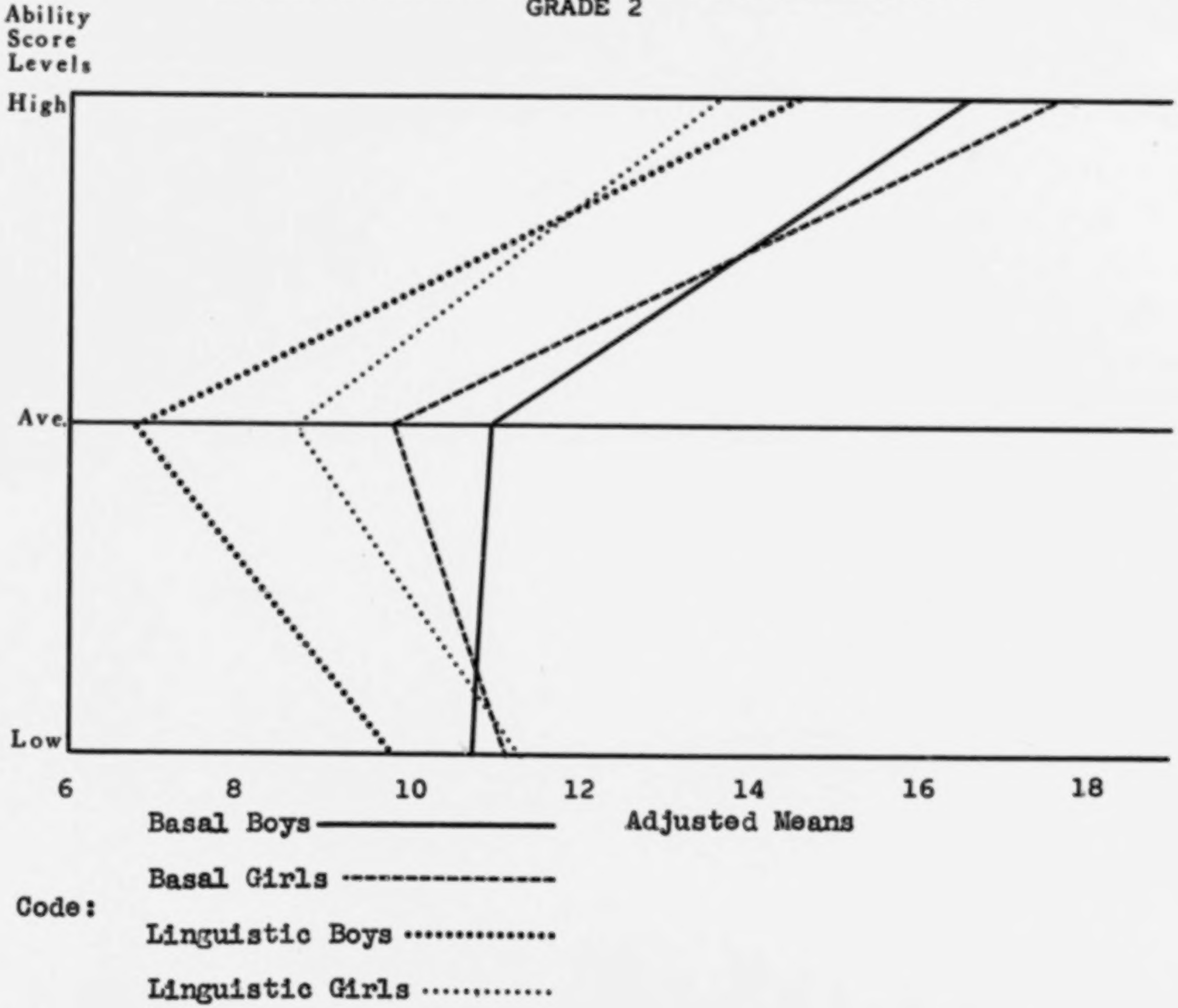


Table 23

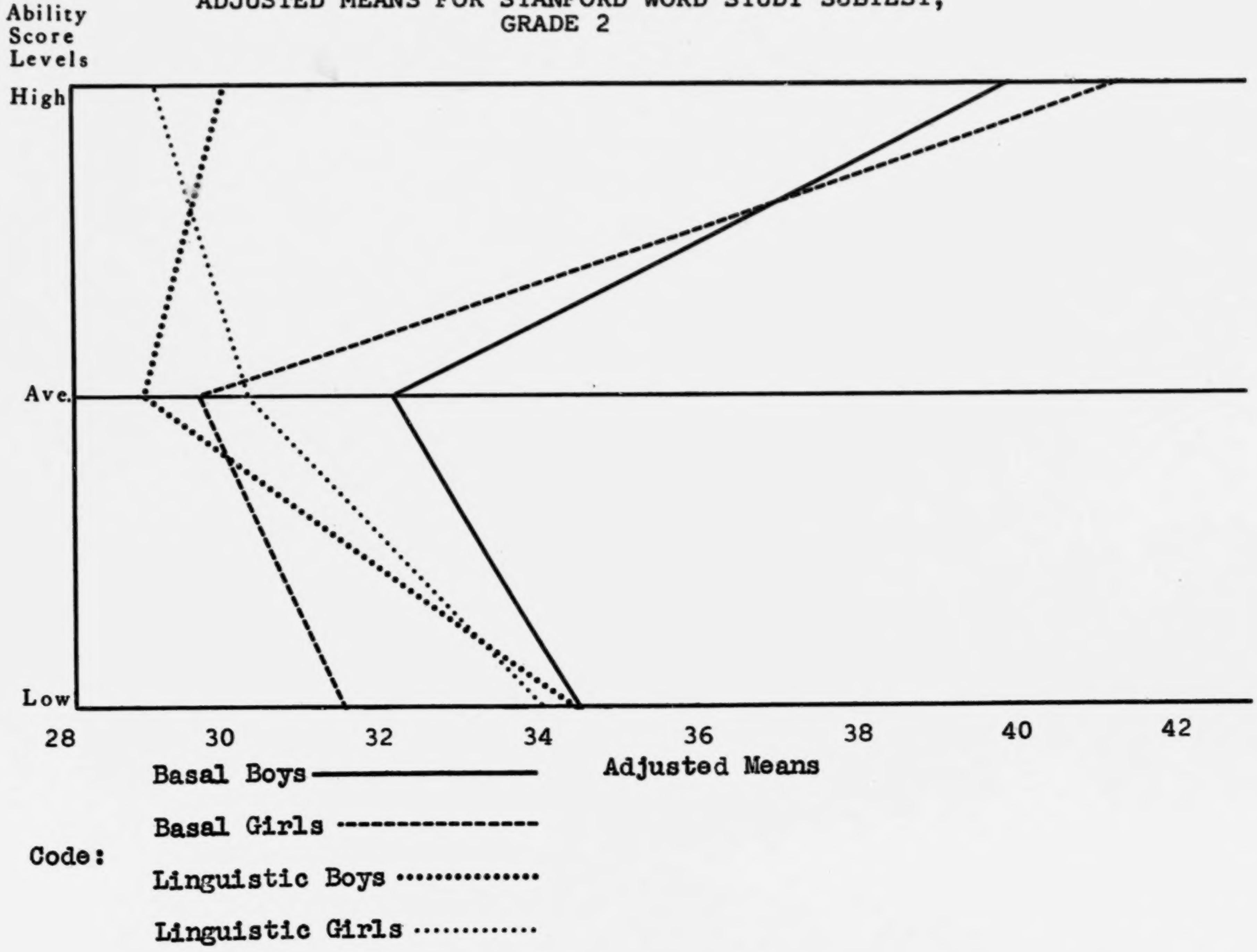
ADJUSTED MEANS FOR STANFORD WORD STUDY
SKILLS SUBTEST, GRADE 2
(Split-Class Mean as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N (Split-Class Means)	 Mean		 Linguistic Approach Mean	 N (Split-Class Means)	 Total Mean	
High	Boys	4	40.07		29.91	4	34.99	←
	Girls	4	41.39		39.05	4	35.22	
	Cell Total	8	40.73	←.01→	29.48	8	35.11	
Average	Boys	3	32.10		28.86	4	30.25	
	Girls	3	29.58		30.22	4	29.94	.01
	Cell Total	6	30.48	← NS →	29.54	8	30.10	
Low	Boys	4	34.41		34.28	3	34.25	
	Girls	4	31.40		34.00	3	32.51	
	Cell Total	8	32.90	← NS →	34.14	6	33.43	←
Total	Boys	11	35.84		30.72	11	33.28	← NS
	Girls	11	34.54		30.82	11	32.68	←
Total Treatment		22	35.19	←.01→	30.77	22		

Significance levels corresponding to F's shown on Table 19 are indicated by arrows for selected comparisons.

Figure 4

ADJUSTED MEANS FOR STANFORD WORD STUDY SUBTEST, GRADE 2



of the treatment groups. None of the remaining interactions was significant. There were no significant differences in the performance of boys and girls on the Word Study Skills test.

The significant interaction was characterized by significant superiority of the basal reader group at the high ability score level, while there was no difference between treatment means at the average and low ability score levels and they were not significant.

Stanford Language Subtest

The Language test consists of two parts: a 40 item multiple-choice Capitalization and Punctuation section and a 35 item Usage section. The Capitalization section samples the proper use of capital letters for proper names, etc., while the Punctuation section primarily measures the use of periods, commas, and question marks. Usage is primarily concerned with correct verb forms. Other usage errors are also included.

The only main effect for which there was a significant difference (and this at the .01 level) was for ability score levels (see Table 24 and Figure 5). There was also a significant treatment by ability score level interaction (as shown in Table 19) which was significant at the .05 level. None of the other interactions was significant.

The significant interaction was characterized by the significant superiority of the basal reader group at the average ability score level, while the treatment differences at the other two levels were not significant.

Comparable data for each of the above five subtests based upon individual pupil scores are found in Appendix D. The analysis of covariance *F* ratios based on individual pupil scores are also found in Appendix D.

Analysis of Criterion Measures for Subsamples

Oral Reading Tests

Three measures of oral reading were administered individually to a random sample of pupils at each ability score level in each treatment group. A table of random numbers was used to select pupils from among the three

Table 24

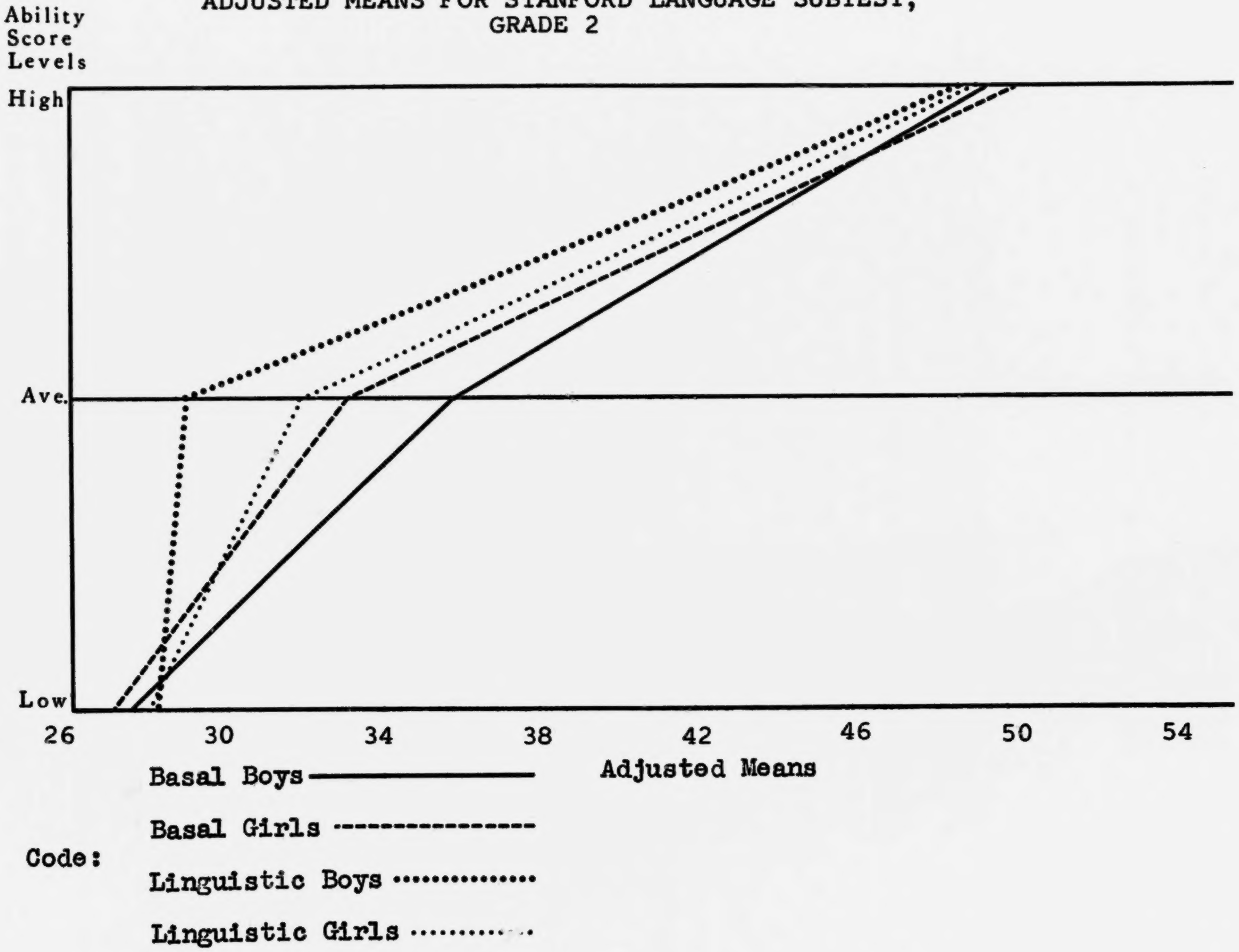
ADJUSTED MEANS FOR STANFORD LANGUAGE
SUBTEST, GRADE 2
(Split-Class Mean as Unit)

Ability Score Level	Sex	Treatments: Basal Reader Approach N (Split-Class Means)	Basal Reader Approach Means		Linguistic Approach Means	Linguistic Approach N (Split-Class Means)	Total Means	
	Boys	4	49.57		49.01	4	49.29 ←	
High	Girls	4	50.34		49.42	4	49.88	
	Cell Total	8	49.95	←NS→	49.21	8	49.58	
	Boys	3	35.79		29.14	4	31.99	
Average	Girls	3	33.09		31.87	4	32.39	
	Cell Total	6	34.44	←.01→	30.50	8	32.19	.01
	Boys	4	27.45		28.30	3	27.82	
Low	Girls	4	27.02		28.10	3	27.51	
	Cell Total	8	27.23	←NS→	28.23	6	27.66 ←	
Total	Boys	11	37.77		36.14	11	36.95 ←	NS
	Girls	11	37.15		37.24	11	37.20 ←	
Total Treatment		22	37.46	←NS→	36.69	22		

Significance levels corresponding to F's shown on Table 19 are indicated by arrows for selected comparisons.

Figure 5

ADJUSTED MEANS FOR STANFORD LANGUAGE SUBTEST,
GRADE 2



ability score levels in each treatment group. There were 90 pupils in this stratified subsample, 45 being in each of the treatment groups and within these groups 15 at each of the three ability score levels. The three oral reading tests were: The Gilmore Oral Reading Test, the Fry Phonetically Regular Words Oral Reading Test, and the Gates Word Pronunciation Test.

The Gilmore Oral Reading Test consists of a series of paragraphs contained in a test booklet which are read aloud by the pupil while the examiner records errors committed by the pupil. The test was scored for Accuracy (expressed as a grade score), and Rate (in terms of words read per minute).

The Fry Phonetically Regular Words Oral Reading Test consists of 30 words which become increasingly more difficult. The total raw score is the number of words read aloud from the list without error. The Fry test is designed to provide a measure of recognition of the type of regular words generally found in reading materials using a linguistic approach.

The Gates test contains 40 words of increasing difficulty which are typical of the words found in basal readers. The total raw score is the number of correctly pronounced words.

The raw score means, standard deviations and analysis of variance F values for the oral reading tests are shown in Appendix C.

Pupils in the basal reader group had significantly higher Gilmore Accuracy raw scores than did pupils in the linguistic treatment. This difference was significant at the .01 level. None of the other differences between treatments on the remaining oral reading measures were significant. Differences among ability score levels were significant for the Gilmore Accuracy score and for the scores on the Gates and Fry tests. The pupils at the high ability score level obtained the highest raw-score means while pupils at the low ability score level obtained the lowest raw-score means. Sex differences favoring the girls were significant at .01 level for Gilmore Accuracy and for scores on the Gates and Fry tests. There were significant ability by sex interactions on these same measures, indicating that differences were not consistent at all ability score levels.

The adjusted means on the oral reading tests obtained at the end of grade 2 are shown in Tables 25, 26, 27, and 28. The analysis of covariance F ratios are presented in Table 29. The interactions are graphed in Figures 6, 7, 8, and 9.

Table 25

ADJUSTED MEANS FOR GILMORE ORAL READING TEST, ACCURACY, GRADE 2

(Individual Pupil Score as Unit)

Ability Score Level	Sex	Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total Mean	
		Treatments						
High	Boys	6	47.27		25.20	4	38.44 ←	┐
	Girls	9	40.64		30.29	11	34.95	│
	Cell Total	15	43.30	← .01 →	28.93	15	36.11	│
Average	Boys	9	30.61		19.36	7	25.69	│
	Girls	6	38.84		37.09	8	37.84	NS
	Cell Total	15	33.90	← .05 →	28.82	15	31.36	│
Low	Boys	7	32.17		32.23	8	32.20	│
	Girls	8	30.14		33.66	7	31.78	│
	Cell Total	15	31.08	← NS →	32.90	15	31.99 ←	┘
Total	Boys	22	35.65		26.01	19	31.18 ←	NS
	Girls	23	36.52		33.29	26	34.80 ←	
Total Treatment		45	36.09	← .01 →	30.22	45		

Significance levels corresponding to F's shown on Table 29 are indicated by arrows for selected comparisons.

Figure 6

ADJUSTED MEANS FOR GILMORE ORAL READING TEST, ACCURACY, GRADE 2

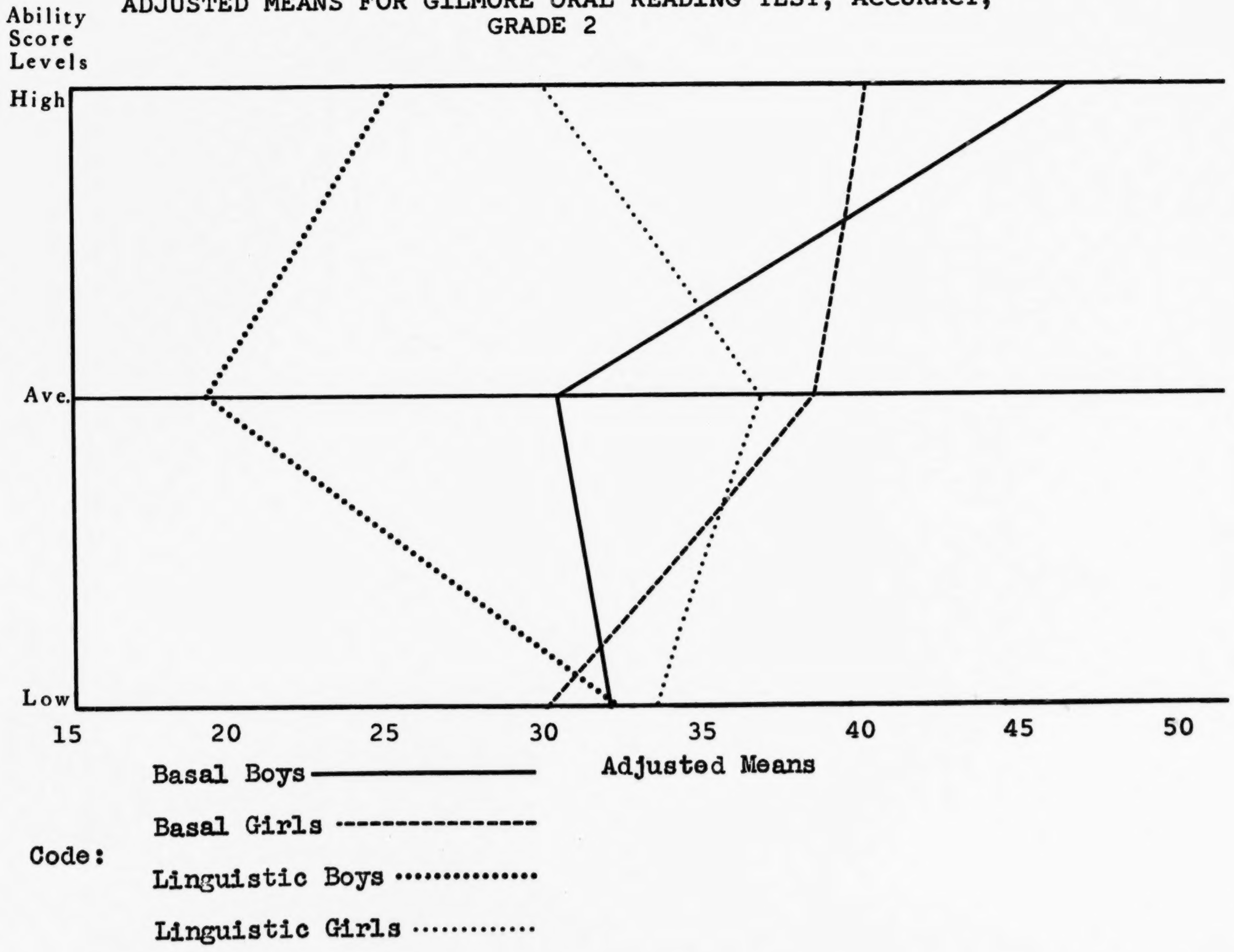


Table 26

ADJUSTED MEANS FOR GILMORE ORAL READING TEST,
RATE, GRADE 2
(Individual Pupil Scores as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
High	Boys	6	95.73		122.21	4	106.32 ←	
	Girls	9	86.82		111.70	11	100.51	
	Cell Total	15	90.39	←NS→	114.50	15	102.44	
Average	Boys	9	67.05		79.78	7	72.62	
	Girls	6	104.87		80.49	8	90.94	NS
	Cell Total	15	82.17	←NS→	80.14	15	81.17	
Low	Boys	7	58.55		138.17	8	101.01	
	Girls	8	77.65		67.47	7	72.90	
	Cell Total	15	68.74	←NS→	105.18	15	86.96 ←	
Total	Boys	22	72.17		113.30	19	91.23 ←	NS
	Girls	23	88.34		90.19	26	89.32 ←	
Total Treatment		45	80.43	←NS→	99.95	45		

Significance levels corresponding to F's shown on Table 29 indicated by arrows for selected comparisons.

Figure 7

ADJUSTED MEANS FOR GILMORE READING TEST, RATE,
GRADE 2

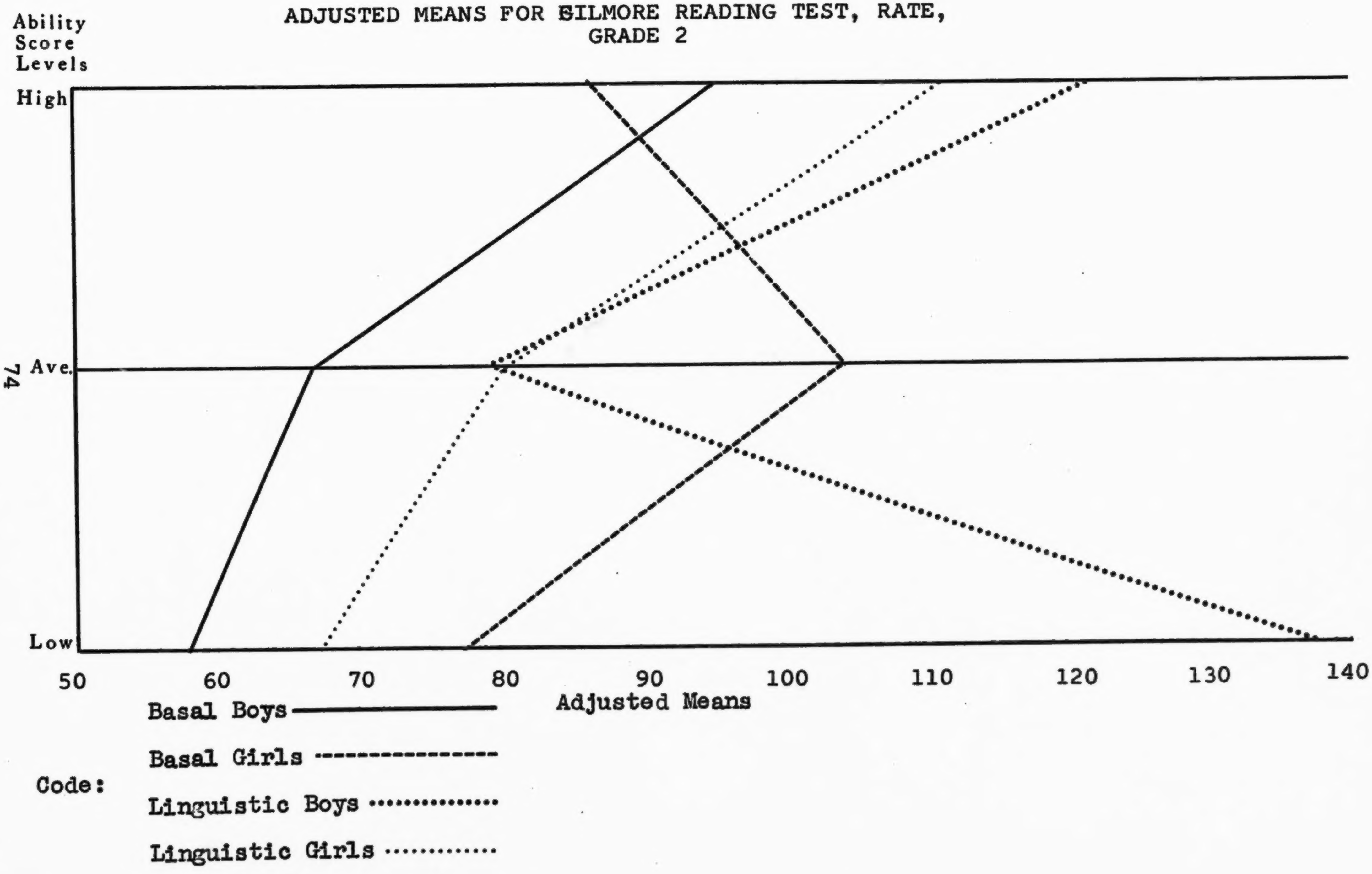


Table 27

ADJUSTED MEANS FOR GATES PRONUNCIATION TEST, GRADE 2

(Individual Pupil Scores as Unit)

Ability Score Level	Sex	Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total Mean	
High	Boys	6	26.04		21.22	4	24.11 ←	
	Girls	9	24.42		22.96	11	23.62	
	Cell Total	15	25.07	← NS →	22.49	15	23.78	
Average	Boys	9	18.41		11.11	7	15.22	
	Girls	6	21.24		24.56	8	23.13	
	Cell Total	15	19.54	← NS →	18.28	15	18.91	NS
Low	Boys	7	18.69		18.91	8	18.81	
	Girls	8	17.28		19.27	7	18.21	
	Cell Total	15	17.94	← NS →	19.08	15	18.51 ←	
Total	Boys	22	20.58		16.52	19	18.70 ←	.05
	Girls	23	21.11		22.46	16	21.82 ←	
Total Treatment		45	20.85	← NS →	19.95	45		

Significance Levels for F ratios shown on Table 29 are indicated by arrows for selected comparisons.

Figure 8

ADJUSTED MEANS FOR GATES WORD PRONUNCIATION TEST, GRADE 2

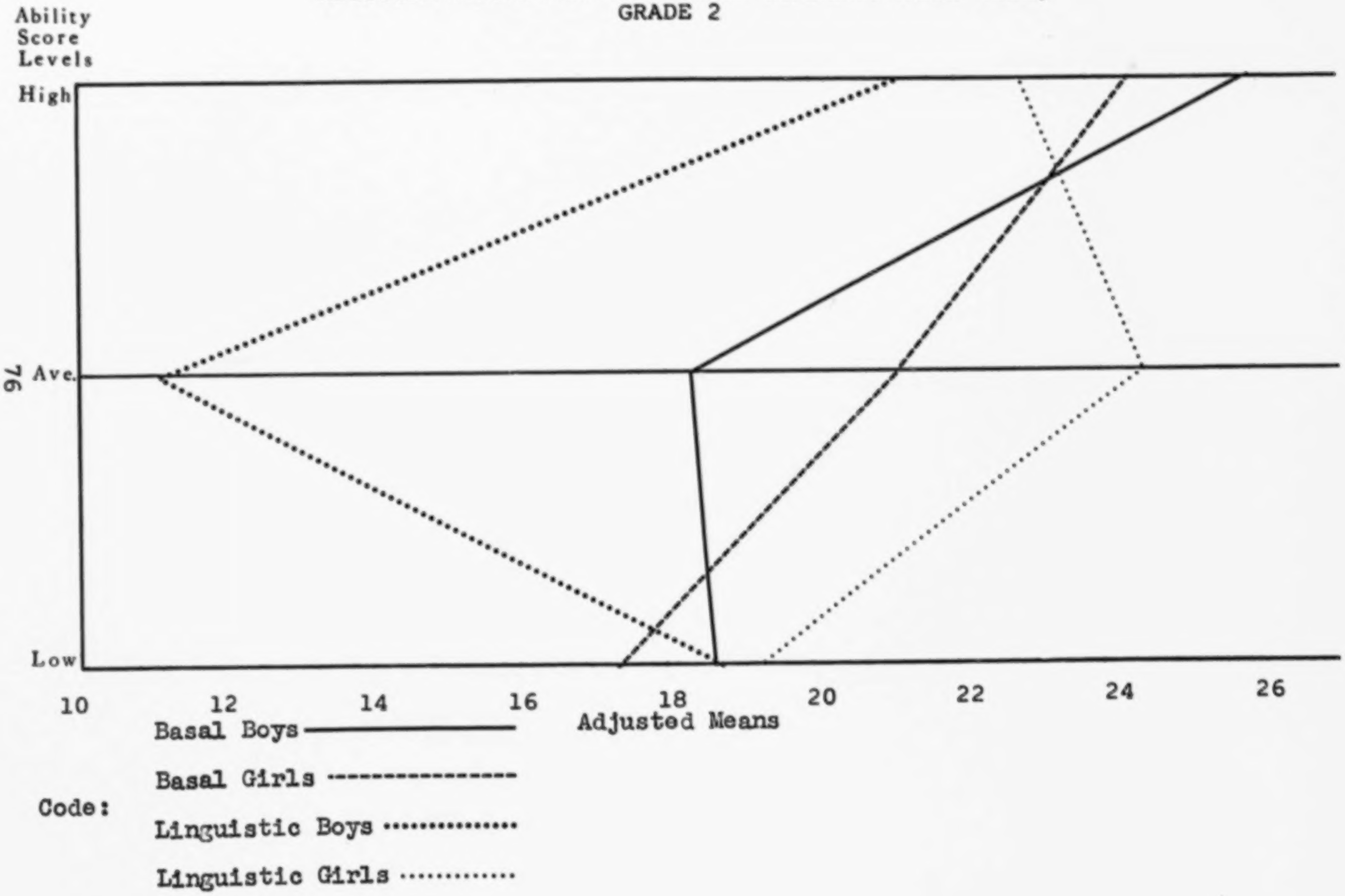


Table 28

ADJUSTED MEANS FOR FRY PHONETICALLY REGULAR WORDS ORAL READING TEST, GRADE 2
(Individual Pupil Scores as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
High	Boys	6	28.78		22.27	4	26.17←	
	Girls	9	26.77		26.27	11	26.49	
	Cell Total	15	27.57	←NS→	25.20	15	26.39	
Average	Boys	9	15.74		9.80	7	13.14	
	Girls	6	18.50		25.01	8	22.22	
	Cell Total	15	16.84	←NS→	17.91	15	17.17	.05
Low	Boys	7	18.81		19.83	8	19.36	
	Girls	8	15.33		18.87	7	16.98	
	Cell Total	15	16.93	←NS→	19.38	15	18.17←	
Total	Boys	22	20.27		16.65	19	18.59←	.05
	Girls	23	20.63		23.88	26	22.36←	
Total Treatment		45	20.46		20.83	45		

Significance levels for F's shown on Table 29 are indicated by arrows for selected comparisons.

Figure 9

ADJUSTED MEANS FOR FRY PHONETICALLY REGULAR WORDS
ORAL READING TEST, GRADE 2

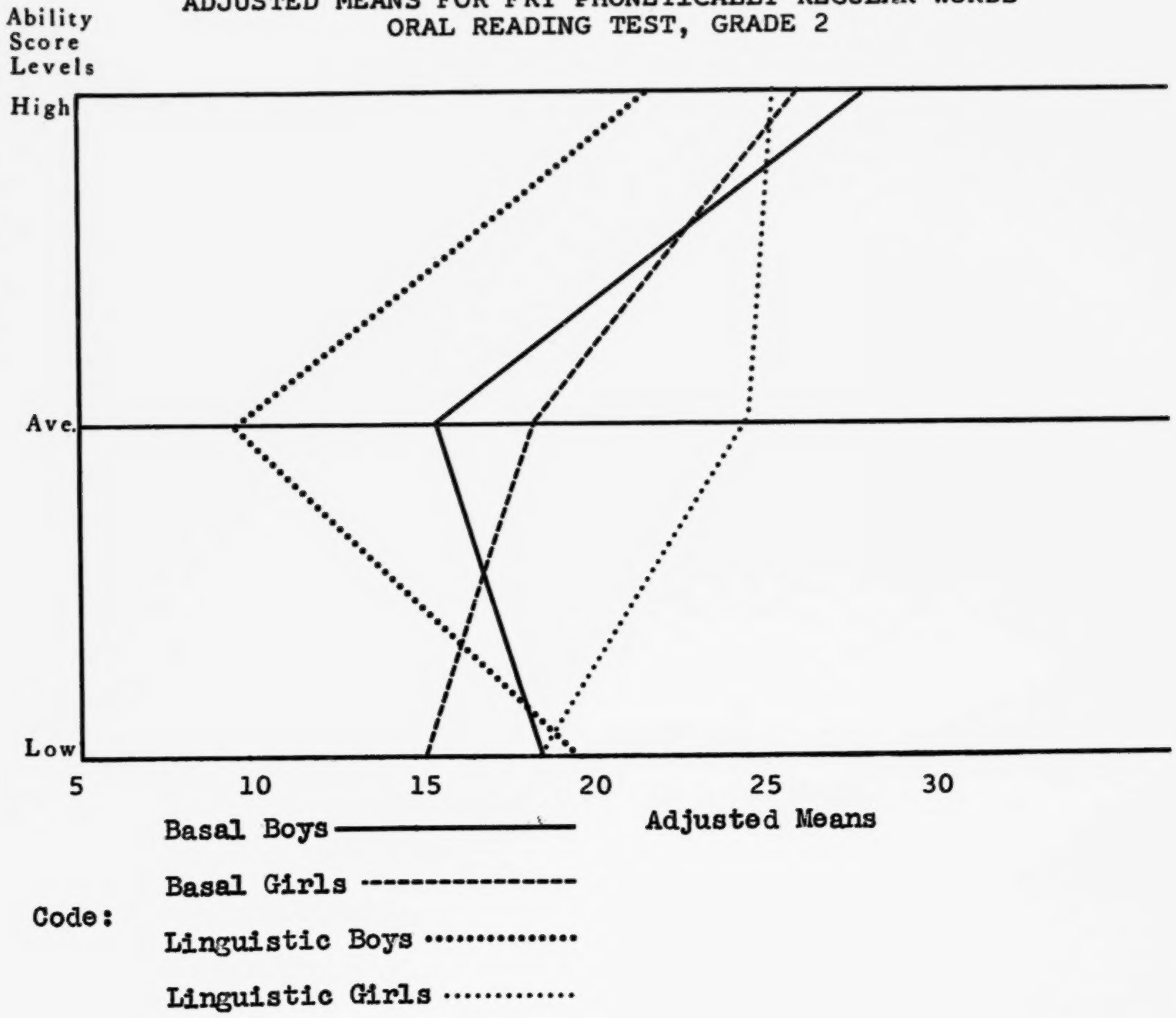


Table 29

ANALYSIS OF COVARIANCE *F* RATIOS FOR ORAL READING TEST, GRADE 2
(Individual Pupil Score as Unit)

Source of Variation	Degrees of Freedom	Gilmore Accuracy	Gilmore Rate	Gates	Fry
Treatment (T)	1,72	7.07**	1.19	.81	.00
Ability (A)	2,72	.64	.42	1.79	3.98*
Sex (S)	1,72	2.69	.01	5.90*	4.49*
T x A	2,72	5.09**	.78	1.10	.95
T x S	1,72	1.92	1.74	3.73	3.18
A x S	2,72	5.16**	.83	5.40**	4.30*
T x A x S	2,72	.33	.70	1.10	.67

*Significant at .05 level.

**Significant at .01 level.

The only significant difference between total treatment adjusted means was for Accuracy of oral reading on the Gilmore test. This difference was significant at the .01 level and favored the pupils in the basal reader group. It is interesting to note that contrary to results found in most of the other criterion measures, when the raw-score means among ability score levels are adjusted for initial differences on reading readiness and intelligence, the only ability score level difference which remained significant was on the Fry test. This was significant at the .05 level. Girls tended to have significantly higher adjusted mean scores on the Gates and Fry tests than did the boys. These differences were significant at the .05 level. The only significant treatment by ability score interaction was for the Accuracy of oral reading score on the Gilmore test. This was significant at the .01 level, and reflects the inconsistency of differences at the three ability score levels. There were also significant ability score level by sex interactions for the Accuracy score on the Gilmore test and on the Gates and Fry tests. All of these interactions were significant at the .01 level, and indicate that sex differences were not consistent from one ability score level to another.

Writing Samples

In addition to the assessment of oral reading, the creative writing skills of pupils in the randomly drawn subsamples were also evaluated. Since the writing of sentences and stories is a basic aspect of the Fries linguistic approach, it was considered important to include this evaluation.

Pupils were asked to write an ending for a stimulus story whose beginning portion was read aloud by the teacher. (A copy of the directions for administering and the writing sample is found in Appendix H.) No help was given by the teacher in spelling or in sentence structure. The stories were evaluated by the project staff on the basis of the following criteria:

1. Running Words (a count of all words appearing in the child's story)

2. Different Words (words appearing more than once were counted only as one word)

3. Spelling (all words spelled correctly were counted no matter how many times they appeared)

4. Polysyllabic Words (all words of more than one syllable were counted)

5. Mechanics-Ratio score (the percentage of accuracy was computed for appropriate use of capitalization, punctuation and indentation)

The raw-score means, and analysis of variance F ratio values, standard deviations, for the writing sample measures are presented in Appendix C.

None of the differences between raw-score means for treatments were significant on any of the five criterion measures. Difference among means for ability score level were significant at the .01 level for all five criteria. Girls tended to write significantly longer stories, use more different words, use more polysyllabic words, and to have greater percentage of accuracy in mechanics, than did boys.

The raw-score means were adjusted for initial differences on the six predictor variables by analysis of covariance. The adjusted means are shown in Tables 30, 31, 32, 33, and 34. The analysis of covariance F ratios are presented in Table 35. The interactions are graphed in Figures 10, 11, 12, 13, and 14.

None of the differences between total treatment adjusted means were significant for any of the five criteria. Difference among ability score levels were significant at the .01 level on all five of the criteria. Girls performed significantly better than boys in Different Words and Running Words, in Spelling and in Polysyllabic Words. These differences were significant at the .05 level.

None of the interactions among adjusted means for treatment by ability score level was significant. (See Table 35.) However the interactions for treatment by sex and for sex by ability score level were significant at the .05 level for Running Words, Different Words, and Spelling. These interactions indicate an inconsistency of performance between sexes, between treatments, and among ability score levels. These inconsistencies can be seen by inspection of Tables 30 through 34 and Figures 10 through 14. For example, from inspection of Table 30 and Figure 10, for Running Words, it is apparent that the trend of adjusted means for pupils at the high ability score level is inconsistent between the sexes across treatments. The basal reader boys have higher adjusted means than the linguistic boys while this trend

Table 30

ADJUSTED MEANS FOR WRITING SAMPLE, NUMBER OF RUNNING WORDS, GRADE 2 (Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments					Total	
		Basal Reader Approach			Linguistic Approach			
		N	Mean		Mean	N	Mean	
High	Boys	6	62.83		55.23	4	59.79 ←	
	Girls	9	83.44		95.27	11	89.95	
	Cell Total	15	75.20	← NS →	84.60	15	79.90	
Average	Boys	9	67.96		28.14	8	50.54	
	Girls	6	32.41		59.79	8	48.05	
	Cell Total	15	53.74	← NS →	45.02	15	49.38	.01
Low	Boys	7	22.50		24.75	8	23.70	
	Girls	8	18.81		18.10	7	18.48	
	Cell Total	15	20.53	← NS →	21.65	15	21.09 ←	
Total	Boys	22	52.09		32.42	19	42.98 ←	.05
	Girls	23	47.65		63.58	26	56.10 ←	
Total Treatment		45	49.82	← NS →	50.42	45		

Significance levels corresponding to F's shown in Table 35 are indicated by arrows for selected comparisons.

Figure 10

ADJUSTED MEANS FOR WRITING SAMPLE, RUNNING WORDS, GRADE 2

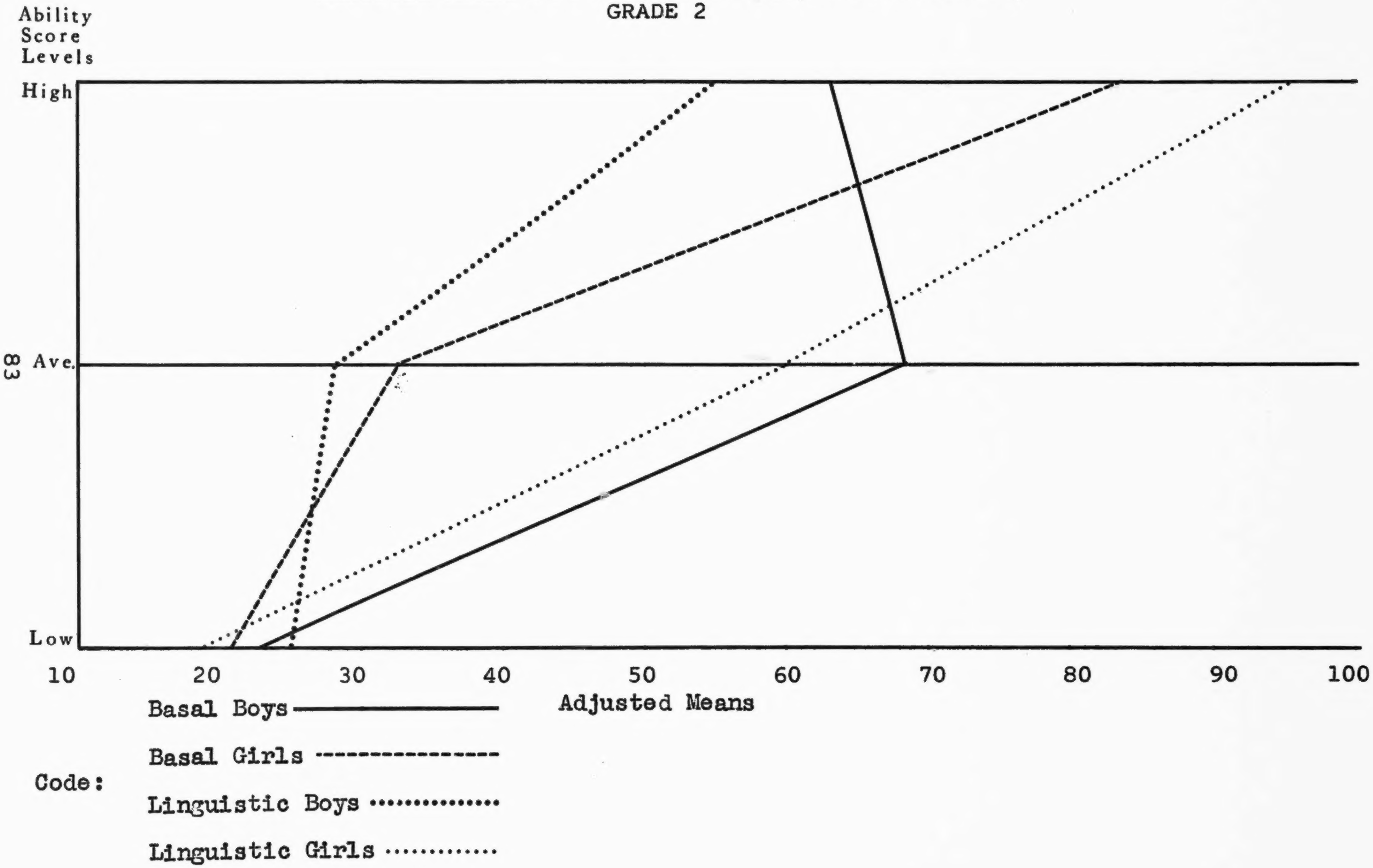


Table 31

ADJUSTED MEANS FOR WRITING SAMPLE, NUMBER OF DIFFERENT WORDS, GRADE 2 (Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N	 Mean		 Linguistic Approach Mean	 N	 Total Mean	
	Boys	6	37.86		35.32	4	36.84←	
High	Girls	9	46.37		51.60	11	49.25	
	Cell Total	15	42.97		47.26	15	45.11	
	Boys	9	31.01		22.00	7	27.07	
Average	Girls	6	20.70		37.43	8	30.26	.01
	Cell Total	15	26.88		30.23	15	28.56	
	Boys	7	20.69		21.47	8	21.11	
Low	Girls	8	14.31		15.41	7	14.82	
	Cell Total	15	17.29		18.64	15	17.96←	
Total	Boys	22	29.59		24.58	19	27.27←	.05
	Girls	23	28.52		37.50	26	33.28←	
Total Treatment		45	29.05←	NS	→32.04	45		

Significance levels corresponding to F's on Table 35 are indicated by arrows for selected comparisons.

Figure 11

ADJUSTED MEANS FOR WRITING SAMPLE, DIFFERENT WORDS, GRADE 2

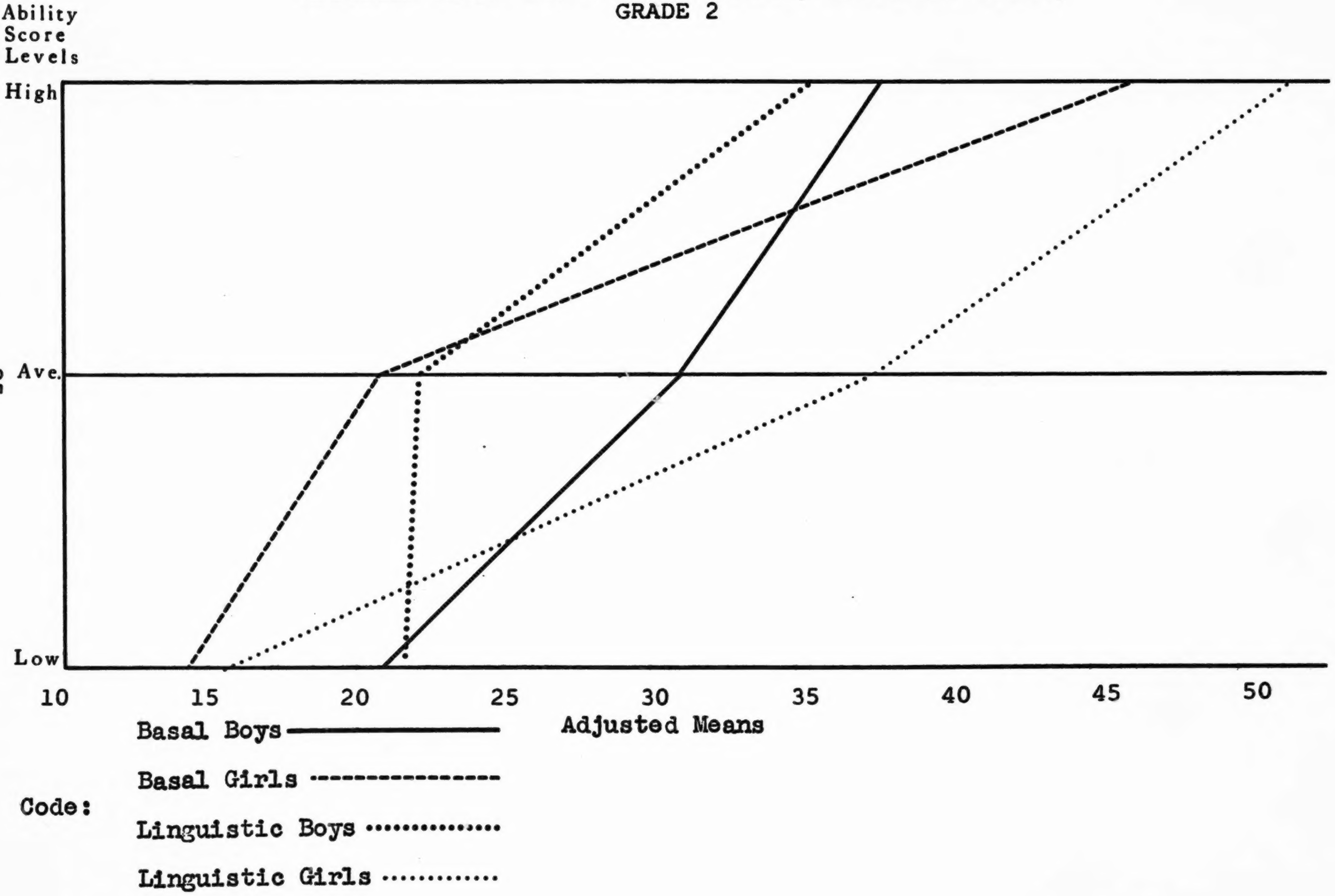


Table 32

ADJUSTED MEANS FOR WRITING SAMPLE, NUMBER OF WORDS
SPELLED CORRECTLY, GRADE 2
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments					
		Basal Reader Approach		Linguistic Approach		Total	
		N	Mean	Mean	N	Mean	
High	Boys	6	52.72	46.81	4	50.35 ←	
	Girls	9	73.38	79.51	11	76.75	
	Cell Total	15	65.12	70.79	15	67.95	
Average	Boys	9	53.62	21.99	7	39.78	
	Girls	6	28.39	48.82	8	40.06	.01
	Cell Total	15	43.53	36.30	15	39.91	
Low	Boys	7	19.43	23.66	8	21.69	
	Girls	8	16.86	15.12	7	16.05	
	Cell Total	15	18.06	19.68	15	18.87 ←	
Total	Boys	22	42.50	27.92	19	35.74 ←	.05
	Girls	23	41.99	52.73	26	47.69 ←	
Total Treatment		45	42.24 ← NS	→ 42.25	45		

Significance levels corresponding to F's shown on Table 35 are indicated by arrows for selected comparisons.

Figure 12

ADJUSTED MEANS FOR WRITING SAMPLE, SPELLING,
GRADE 2

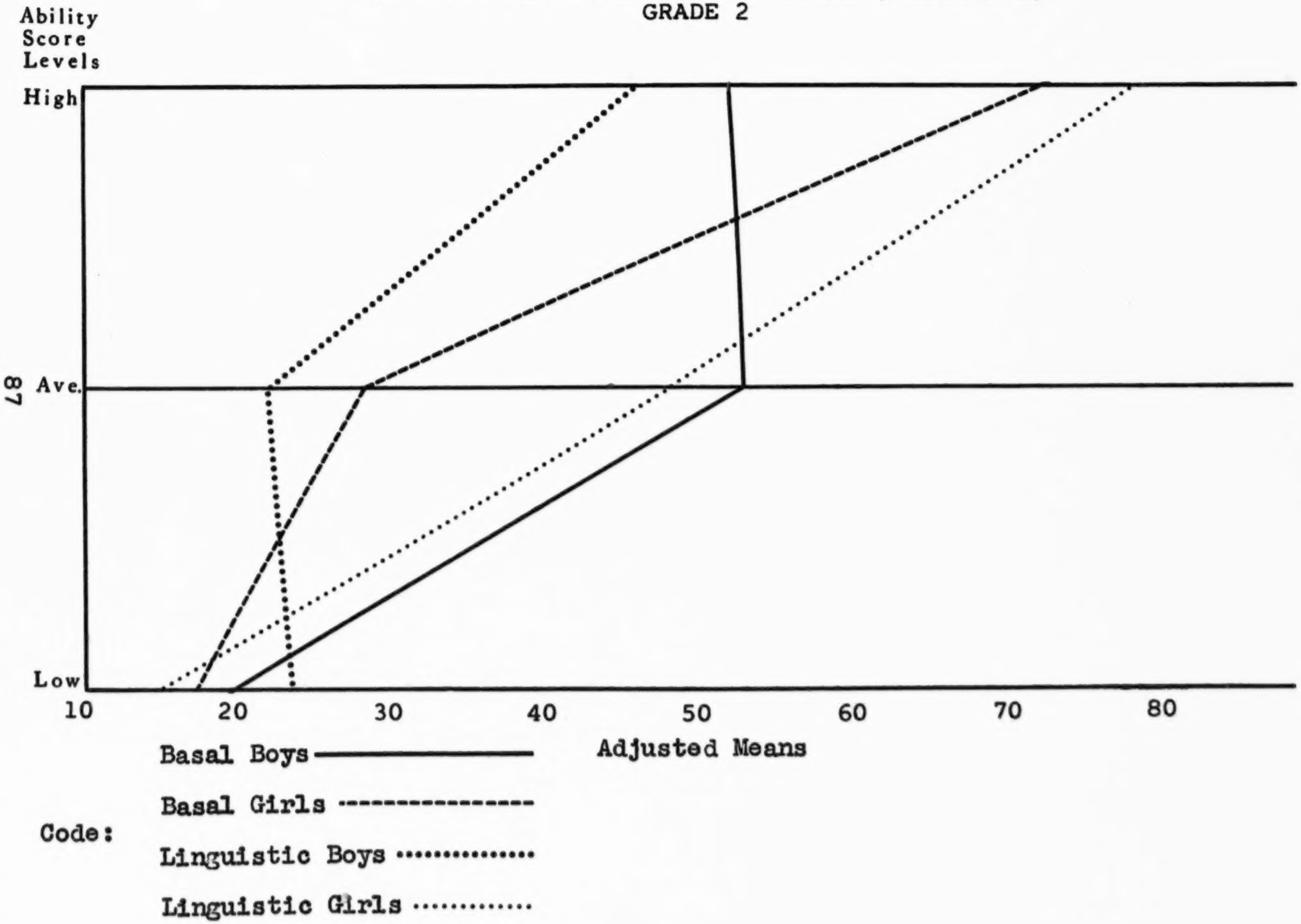


Table 33

ADJUSTED MEANS FOR WRITING SAMPLE, NUMBER OF POLYSYLLABIC WORDS, GRADE 2
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments				Total	
		Basal Reader Approach		Linguistic Approach			
		N	Mean	Mean	N	Mean	
High	Boys	6	13.21	10.83	4	12.26 ←	
	Girls	9	18.11	23.37	11	21.00	
	Cell Total	15	16.15	20.03	15	18.09	
Average	Boys	9	10.57	7.72	7	9.33	
	Girls	6	8.27	12.79	8	10.85	.01
	Cell Total	15	9.65	10.42	15	10.04	
Low	Boys	7	4.61	7.68	8	6.24	
	Girls	8	5.25	5.50	7	5.37	
	Cell Total	15	4.95	6.66	15	5.81 ←	
Total	Boys	22	9.39	8.36	19	8.91 ←	.05
	Girls	23	11.07	15.30	26	13.32 ←	
Total Treatment		45	10.25 ←NS→	12.37	45		

Significance levels corresponding to F's shown on Table 35 are indicated by arrows for selected comparisons.

Figure 13

ADJUSTED MEANS FOR WRITING SAMPLE, POLYSYLLABIC WORDS, GRADE 2

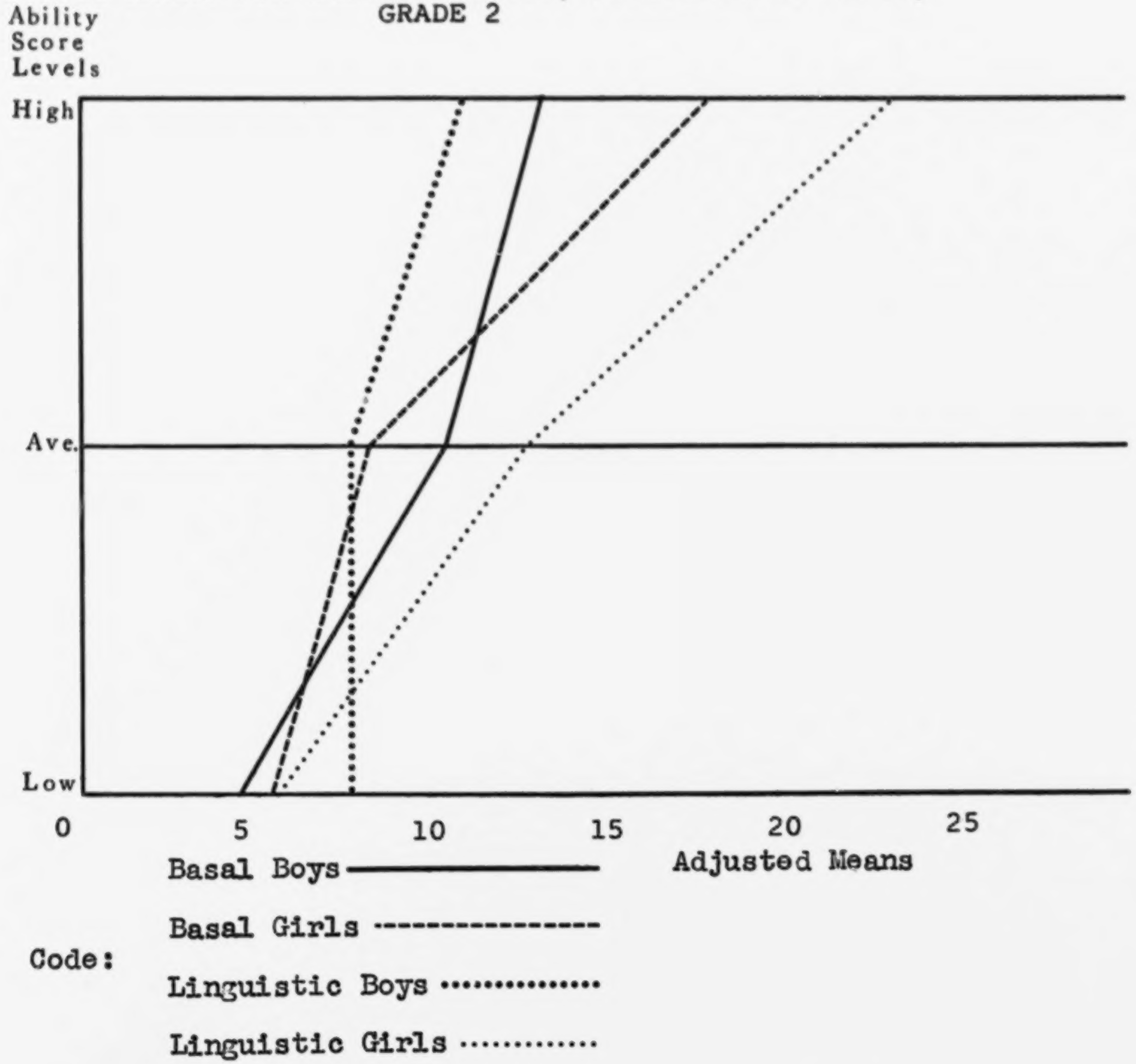


Table 34

ADJUSTED MEANS FOR WRITING SAMPLE, MECHANICS-RATIO, GRADE 2
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean	Linguistic Approach Mean	Linguistic Approach N	Total Mean	
High	Boys	6	68.40	70.61	4	69.28	
	Girls	9	70.44	68.53	11	69.39	
	Cell Total	15	69.62	69.09	15	69.35	
Average	Boys	9	37.93	53.29	7	44.65	
	Girls	6	41.74	55.37	8	49.53	.01
	Cell Total	15	39.46	54.40	15	46.93	
Low	Boys	7	68.97	53.01	8	60.46	
	Girls	8	66.71	58.28	7	62.77	
	Cell Total	15	67.76	55.47	15	61.62	
Total	Boys	22	56.12	56.82	19	56.44	NS
	Girls	23	61.65	61.72	26	61.69	
Total Treatment		45	58.95	59.65	45		

Significance levels corresponding to F's shown on Table 35 are indicated by arrows for selected comparisons.

Figure 14

ADJUSTED MEANS FOR WRITING SAMPLE, MECHANICS-RATIO, GRADE 2

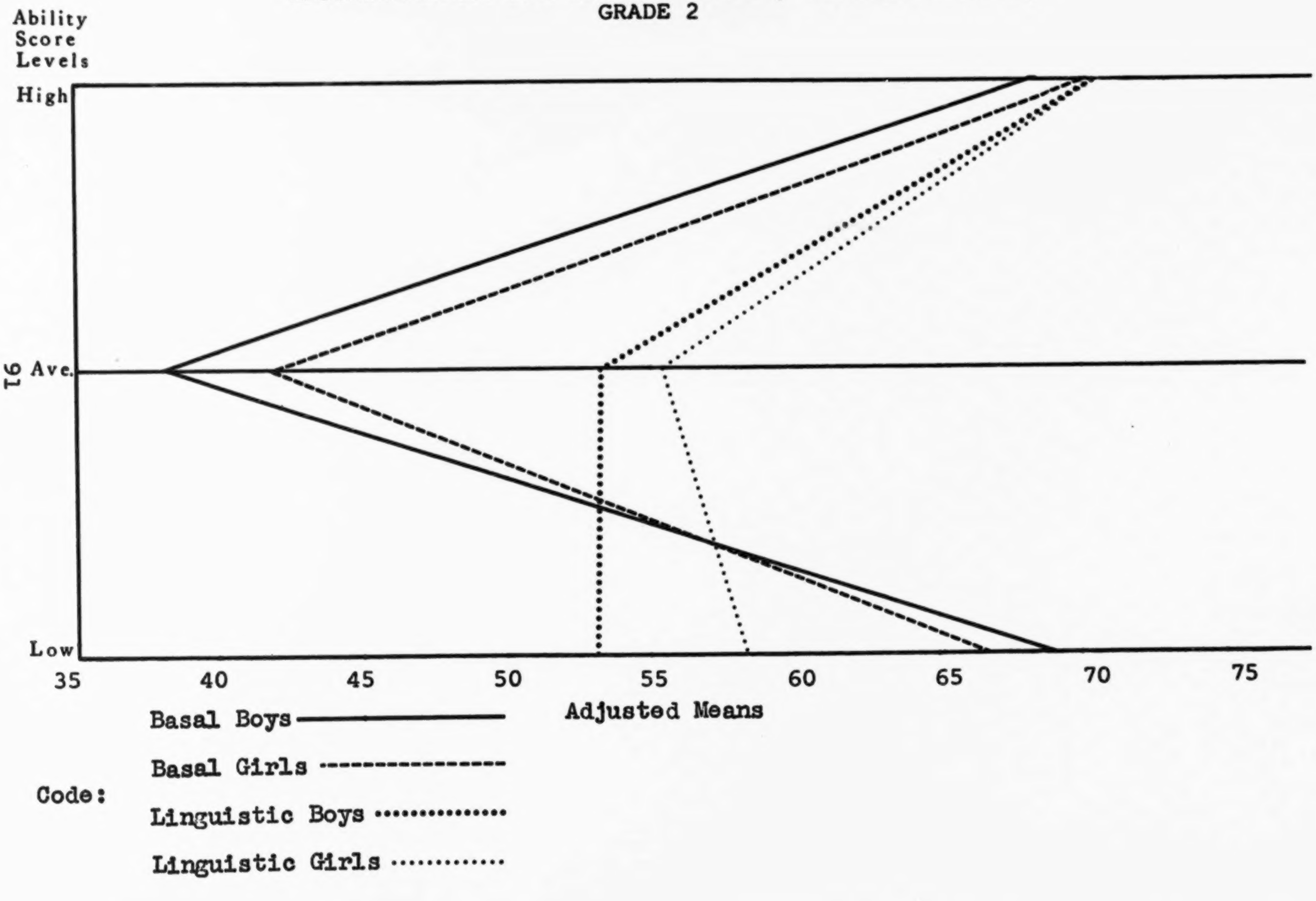


Table 35

ANALYSIS OF COVARIANCE *F* RATIOS FOR WRITING SAMPLE, GRADE 2 (Individual Pupil Score as Unit)

Source of Variation	Degrees of Freedom	Running Words	Different Words	Spelling	Polysyllabic Words	Mechanics Ratio
Treatment (T)	1,72	.01	.48	.06	.78	.01
Ability (A)	2,72	6.03**	5.63**	5.97**	3.22*	6.98**
Sex (S)	1,72	4.57*	4.20*	5.50*	6.41*	1.22
T x A	2,72	.22	.09	.23	.06	2.78
T x S	1,72	5.77*	3.69*	3.99*	1.41	.00
A x S	2,72	3.32*	3.33*	3.61*	2.67	.09
T x A x S	2,72	2.84	1.65	2.83	1.03	.15

*Significant at .05 level.

**Significant at .01 level.

is reversed for girls in the two treatments. Within treatments, however, the girls have outperformed the boys. The pattern is similar at the average ability score level, but is reversed, although differences are quite small, at the low ability score level. Inspection of the remaining tables and figures will reveal similar inconsistencies. None of the three way interactions was significant.

This completes the analysis of data for the second grade aspect of the investigation. Data for the third-grade study are reported in Chapter IV.

CHAPTER IV

ANALYSIS OF THIRD-GRADE DATA

This chapter presents the analysis of data for teachers and pupils for the third-grade study. Included in the present chapter are: (1) analysis of data used as predictor variables for teachers; (2) analysis of data used as predictor variables for pupils, including first grade pretests and other pertinent data; (3) an examination of variables to determine their usefulness in adjusting the mean scores of posttests used as criterion measures; and (4) an analysis of data of posttests used as criterion measures.

Data pertaining to teachers were obtained for age, total years of teaching experience, total years of third-grade teaching experience, number of absences, and rating of teaching efficiency.

Before the first-grade experiments began, a pretest battery consisting of an intelligence test and two reading readiness tests was administered to all pupils in the project. Based upon these data, new means and standard deviations were computed for pupils remaining in the third year of the study.

Following the completion of the 161 day third grade experimental period in May 1967, a silent reading test was administered to all pupils remaining in the project. In addition, oral reading tests were individually administered to a randomly drawn sample of pupils from each treatment group. Finally, a writing sample was obtained and scored for pupils in the subsample.

The analysis of data for pupils is based upon the use of split-class means as input. Data based upon individual score input are included in the Appendix.

Analysis of Predictor Variables for Teachers

The means and standard deviations for teacher data in the third year of the study are shown in Table 36; the analysis of variance *F* ratios are presented in Table 37.

Table 36

MEANS AND STANDARD DEVIATIONS FOR AGE, EXPERIENCE, ABSENCE, AND RATING OF THIRD GRADE TEACHER

Variable	Basal Reader Approach Ability Score Level			Linguistic Approach Ability Score Level		
	High	Average	Low	High	Average	Low
			Means			
Age	41.42	40.23	40.28	48.32	28.41	34.49
Total Experience	8.80	14.23	9.85	23.58	5.00	8.35
3rd Grade Exp.	5.34	6.14	5.00	11.46	2.30	2.87
Absence	6.14	3.53	10.70	2.87	17.45	7.64
Rating	8.96	6.89	6.96	8.65	8.39	6.31
			Standard Deviations			
Age	12.21	14.73	10.57	14.40	6.23	4.63
Total Experience	6.61	13.46	6.04	13.10	4.41	5.00
3rd Grade Exp.	3.87	4.12	1.47	5.90	2.49	2.17
Absence	8.68	3.51	3.47	1.30	15.37	2.04
Rating	1.05	1.49	1.12	1.64	1.12	0.46

Table 37

ANALYSIS OF VARIANCE *F* RATIOS FOR TEACHER CHARACTERISTICS IN GRADE 3

Source of Variation	df	*F* Ratios				
		Teacher Age	Total Teaching Experience	3rd Grade Experience	Teacher Absence	Teacher Rating
Treatment (T)	1,18	0.38	0.19	0.00	0.39	0.01
Ability Score Level (A)	2,18	1.69	1.56	3.08	0.98	4.97*
T x A	2,18	1.05	2.91	3.00	2.57	1.68

*Significant at the .05 level.

**Significant at the .01 level.

Teacher Age

The age of teachers in the basal reader group ranged from 21 to 57 years, with a mean of 40.63; the ages of teachers in the linguistic group ranged from 22 to 59 years, with a mean of 37.07. The difference between mean ages of teachers in the two treatments was not significant.

Total Teaching Experience

The range of total years of teaching experience for teachers in the basal reader group was from 0 years to 31 years, with a mean of 10.29. The range for teachers in the linguistic group was from 5 months to 32 years, with a mean of 12.31 years. There were no significant differences between the means for treatments or the means among ability score levels.

Years of Teaching Experience in Third Grade

The range of teaching experience in third grade for the teachers in the basal reader treatment was from 0 to 10 years, with a mean of 5.49 years. Teachers in the linguistic group had a range of 0 to 15 years of experience in third grade, with a mean of 5.54. There were no significant differences between the treatment means or among the means for ability score levels. None of the interactions was significant.

Teacher Absence

There were no significant differences between the mean number of days absent for teachers in the two treatment groups or among the three ability score levels. None of the interactions was significant.

Teacher Rating

The teachers were rated on a five-point scale in which a rating of 5 was the highest possible rating and a rating of 1 was the lowest. Each teacher was rated by each of the two raters. One rating was made by a staff member in the Curriculum Office of the School District of Philadelphia and the other rating was by the principal investigator. The rating assigned to each teacher was the sum of these two ratings.

The mean rating for teachers in the basal reader group was 7.60; for the teachers in the linguistic group it was 7.78. The difference between means for treatments was not significant. However, there were significant differences for teacher ratings among ability score levels. Teachers at the high ability score level were rated significantly better than those at the low ability score level.

Analysis of Predictor Variables for Pupils

Pre-experimental data for pupils for reading readiness and intelligence as well as for attendance are reported below.

Reading Readiness

Means and standard deviations for the Metropolitan Readiness Test and for the Murphy-Durrell Diagnostic Readiness Test, which were administered to all pupils at the beginning of grade 1, were rerun for those pupils remaining in the third year of the investigation. Differences between means were tested by analysis of variance.

The Metropolitan test provides scores for six subtests and a total readiness score. Since correlations between performance on each of the subtests and on the total score were all high, only the total readiness score was used.

Table 38 shows the raw-score means and standard deviations for Metropolitan total scores for pupils in grade 3. Analysis of variance F ratios are shown in Table 39. There were no significant differences between treatments or sexes. However, differences among ability score levels continued to be significant at the .01 level. None of the interactions was significant. The Murphy-Durrell Diagnostic Readiness Test contains subtests to measure the ability to hear sounds in words (Phonemes), knowledge of letter names (Letter Names), and ability to learn and recall word forms (Learning Rate).

The means and standard deviations for Murphy-Durrell test scores in grade 3 are shown in Table 40. The analysis of variance F ratios are presented in Table 41.

When the Murphy-Durrell test data were recomputed for third grade pupils, there were no significant dif-

Table 38

MEANS AND STANDARD DEVIATIONS FOR METROPOLITAN READINESS TEST TOTAL SCORE, GRADE 3[a]

(Split-Class Mean as Unit)

Group	Means	Standard Deviations[b]
High Basal Boys	74.48	9.09
High Basal Girls	70.60	13.5
High Linguistic Boys	68.27	9.81
High Linguistic Girls	67.35	10.4
Average Basal Boys	47.29	13.9
Average Basal Girls	58.00	48.2
Average Linguistic Boys	43.56	11.0
Average Linguistic Girls	42.26	9.04
Low Basal Boys	25.75	9.60
Low Basal Girls	29.32	8.97
Low Linguistic Boys	25.28	8.62
Low Linguistic Girls	27.07	5.34
Total Treatments[b]		
Basal	53.51	
Linguistic	49.72	

[a] Administered as a pretest beginning of Grade 1, September 1965.

[b] Standard deviations for total treatments were not available.

Table 39

ANALYSIS OF VARIANCE F RATIOS FOR METROPOLITAN READINESS TEST TOTAL SCORE, GRADE 3[a]
(Split-Class Mean as Unit)

Source of Variation	df	F Ratios
Treatment (T)	1,32	0.84
Ability Score Level (A)	2,32	218.54**
Sex (S)	1,32	0.03
T x A	2,32	0.64
T x S	1,32	0.16
A x S	2,32	0.31
T x A x S	2,32	0.05

*Significant at .05 level.

**Significant at .01 level.

[a] Administered as a pretest beginning of grade 1, September 1965.

Table 40

MEANS AND STANDARD DEVIATIONS FOR MURPHY-DURRELL DIAGNOSTIC READINESS TEST FOR PUPILS IN GRADE 3[a]

(Split-Class Mean as Unit)

Group	Phonemes	Letter Names	Learning Rate
		Means	
High Basal Boys	33.24	46.36	11.30
High Basal Girls	34.98	46.86	12.20
High Linguistic Boys	25.56	43.06	11.63
High Linguistic Girls	28.90	42.47	10.69
Average Basal Boys	18.86	31.54	9.50
Average Basal Girls	20.38	33.28	9.52
Average Linguistic Boys	14.29	25.60	7.87
Average Linguistic Girls	14.11	27.63	8.03
Low Basal Boys	6.96	13.11	6.18
Low Basal Girls	7.63	13.58	6.47
Low Linguistic Boys	4.72	15.00	6.88
Low Linguistic Girls	6.70	14.23	7.77
Total Treatments			
Basal	23.02	33.94	9.74
Linguistic	17.80	30.68	9.19
	Standard Deviations[b]		
High Basal Boys	12.1	6.06	4.30
High Basal Girls	10.2	5.39	3.75
High Linguistic Boys	12.3	7.58	3.72
High Linguistic Girls	13.2	9.01	3.70
Average Basal Boys	11.4	13.4	3.38
Average Basal Girls	8.63	16.7	4.63
Average Linguistic Boys	9.93	10.6	3.21
Average Linguistic Girls	10.2	11.0	2.94
Low Basal Boys	6.09	8.53	3.62
Low Basal Girls	5.69	6.43	2.63
Low Linguistic Boys	3.81	8.58	3.73
Low Linguistic Girls	4.97	9.67	3.63

[a] Administered as a pretest beginning of grade 1, September 1965

[b] Standard deviations for total treatments were not available.

Table 41

ANALYSIS OF VARIANCE F RATIOS FOR MURPHY-DURRELL DIAGNOSTIC READINESS TEST FOR PUPILS IN GRADE 3 (Split-Class Mean as Unit)

Source of Variation	df	Murphy-Durrell Subtests Phonemes	Letter Names	Learning Rate
Treatment (T)	1,32	6.44*	0.80	0.02
Ability Score Level (A)	2,32	104.36**	337.49**	24.79**
Sex (S)	1,32	1.29	0.15	0.04
T x A	2,32	1.02	3.84*	1.41
T x S	1,32	0.08	0.19	0.91
A x S	2,32	0.32	0.14	0.23
T x A x S	2,32	0.09	0.76	1.33

*Significant at .05 level.

**Significant at .01 level.

ferences between raw-score means for treatments. Differences among ability score level means were significant at the .01 level. There were no significant mean differences for sex, and none of the interactions was significant.

Intelligence

The Pintner-Cunningham Primary Test of General Ability was the intelligence test administered to all pupils as part of the pretest battery for the project in first grade.

The data were analyzed for pupils remaining in the third year of the project. The means and standard deviations are shown in Table 42; the analysis of variance *F* ratios are presented in Table 43.

There were no significant differences between raw score means for treatments or sexes. Differences among ability score levels were significant at the .01 level. None of the interactions was significant.

Pupil Absence

Pupil absences during the third grade were recorded by teachers and were obtained from school records. The means and standard deviations for pupil absence in the third grade are shown in Table 44. The analysis of variance *F* ratios are presented in Table 45. There were no significant differences between treatments or sexes for pupil absences. The differences among mean number of absences for ability score levels was significant at the .05 level. Pupils at the high ability score level had the most absences, while pupils at the average ability level had the fewest absences.

The data for third grade pupils based upon tests administered as part of the present battery in the first grade study were next examined for consideration as control variables in the analysis of the third grade posttest criterion measures. The results of this examination are reported below.

Table 42

MEANS AND STANDARD DEVIATIONS FOR
PINTNER-CUNNINGHAM PRIMARY TEST RAW-SCORES,
GRADE 3
(Split-Class Mean as Unit)

Group	Means	Standard Deviations[a]
High Basal Boys	42.67	7.30
High Basal Girls	42.92	5.45
High Linguistic Boys	40.65	7.17
High Linguistic Girls	40.92	7.40
Average Basal Boys	28.64	10.3
Average Basal Girls	32.66	8.11
Average Linguistic Boys	28.22	7.57
Average Linguistic Girls	27.89	8.57
Low Basal Boys	16.11	7.95
Low Basal Girls	19.37	7.44
Low Linguistic Boys	17.20	6.98
Low Linguistic Girls	19.83	7.47
Total Treatments[a]		
Basal	32.74	
Linguistic	31.31	

[a] Standard deviations for total treatments were not available.

Table 43

ANALYSIS OF VARIANCE F RATIOS FOR PINTNER-CUNNINGHAM PRIMARY TEST RAW-SCORES, GRADE 3
(Split-Class Mean as Unit)

Source of Variation	df	F Ratio
Treatment (T)	1,32	0.00
Ability Score Level (A)	2,32	149.36**
Sex (S)	1,32	2.79
T x A	2,32	1.17
T x S	1,32	1.71
A x S	2,32	0.06
T x A x S	2,32	0.06

*Significant at .05 level.

**Significant at .01 level.

Table 44

MEANS AND STANDARD DEVIATIONS FOR
PUPIL ABSENCE IN GRADE 3
(Split-Class Mean as Unit)

Group	Mean	Standard Deviations[a]
High Basal Boys	11.76	6.32
High Basal Girls	9.72	5.24
High Linguistic Boys	10.90	6.87
High Linguistic Girls	13.33	7.78
Average Basal Boys	7.04	7.82
Average Basal Girls	7.10	5.28
Average Linguistic Boys	7.93	7.56
Average Linguistic Girls	8.09	7.93
Low Basal Boys	11.14	9.68
Low Basal Girls	10.00	10.30
Low Linguistic Boys	6.52	7.68
Low Linguistic Girls	7.53	6.61
Total Treatments[a]		
Basal	9.51	
Linguistic	9.53	

[a] Standard deviations for total treatments were not available.

Table 45

ANALYSIS OF VARIANCE F RATIOS FOR PUPIL ABSENCE IN GRADE 3

(Split-Class Mean as Unit)

Source of Variation	df	F Ratio
Treatment (T)	1,32	0.26
Ability Score Level (A)	2,32	3.51*
Sex (S)	1,32	0.10
T x A	2,32	2.25
T x S	1,32	0.83
A x S	2,32	0.04
T x A x S	2,32	0.28

*Significant at .05 level.

**Significant at .01 level.

Selection of Covariates for Control of Relevant Predictor Variables, Grade 3

Each of the four criterion variables, based upon the four subtests of the Stanford Achievement Test administered to pupils in the total sample, was correlated with each of the predictor variables for boys and girls within ability score levels across treatment groups. For each predictor variable, medians were computed from 48 separate correlations (1 correlation for each of the 12 cells for each of 4 criterion variables).

The median within-cell correlations are presented in Table 46, along with the summary of analysis of variance F ratios for treatment effects. The data in this table were examined to determine the usefulness of the predictor variables as covariates in the adjustment of mean scores of the final outcome measures.

It was hoped that the random assignment of teachers and classes to treatments in the original first-grade study would balance the two method groups on variables that could affect performance on criterion variables. Since, in the first-grade study, there were significant differences between treatments on several of the pupil pretest and teacher variables, it was desirable to adjust the means of the criterion measures for the effects of these initial differences.

Variables were selected as covariates when the median within-cell correlation between predictor variable and criterion measures was relatively high and/or there was a significant difference between treatment mean scores on the predictor.

On the basis of the criteria cited above, five variables were selected as covariates to be used in the third-grade study: the three Murphy-Durrell subtest scores (Phonemes, Letter Names, and Learning Rate); the Metropolitan test total readiness scores; and the Pintner-Cunningham total raw score. The only significant difference across treatments in the third year was for the Murphy-Durrell subtest for Phonemes. However, the four other predictor variables mentioned as covariates showed reasonably high correlations with criterion measures, and were also included.

The statistical procedure employed in the second-grade study for controlling the effects of relevant variables in the analysis of criterion measures was also used in the third-grade study: namely, analysis

Table 46

SUMMARY OF ANALYSIS OF VARIANCE F RATIOS FOR PREDICTOR VARIABLES BETWEEN TREATMENTS AND MEDIAN WITHIN-CELL CORRELATIONS BETWEEN PREDICTOR VARIABLES AND FOUR CRITERION VARIABLES IN GRADE 3

Pretest Variables	Median Within Cell r	Treatment Variance F Ratio
Total Raw-Score Metropolitan Readiness	.49	0.84
Murphy-Durrell Letter Names	.40	0.80
Murphy-Durrell Phonemes	.39	6.44*
Total Raw-Score Pintner-Cunningham	.36	0.00
Murphy-Durrell Learning Rate	.34	0.02
Class Size	.06	2.85
Total Teacher Experience	.02	0.19
3rd Grade Teaching Experience	-.04	0.00
Teacher Age	-.06	0.38
Teacher Rating	-.07	0.01
Pupil Absence	-.10	0.26
Teacher Absence	-.12	0.39

*Significant at .05 level.

**Significant at .01 level.

of covariance in a 2 x 3 x 2 factorial design (treatment by ability score level by sex). Split-class means (split on basis of sex with separate means computed for boys and girls) were used as the statistical unit. As noted previously, the data were also analyzed using individual pupil scores as the basic input. However, only the data based on split-class means will be presented in the body of the text. Comparable analyses for the criterion measures (based upon individual pupil scores) will be found in Appendix G.

Analysis of Criterion Measures for Total Sample, Grade 3

The selection of an appropriate level of the Stanford Achievement Test for use as the criterion measure in the third year of the study presented a problem. An examination of the frequency distributions on the Stanford test, Primary II Battery, revealed that the scores of pupils at the low ability score level tended to cluster toward the lower end of the distribution, while scores of pupils at the high ability score level tended to cluster at the upper end of the distribution. Assuming at least a year's growth for pupils at the high ability score level, it was predicted that the Primary II Battery administered at the end of the third year would be skewed even more at the upper end of the range. According to the test manual, the Primary II Battery is appropriate for pupils in the middle of grade 2 to the end of grade 3. The Intermediate Battery I, is appropriate for pupils in grades 4 and 5. Considering the distribution of scores for pupils in grade 2, the Intermediate Battery was predicted to be too difficult for pupils at the low ability score level.

It was therefore decided to administer both the Primary Battery II test and the Intermediate Battery I test to all pupils and to combine scores from the two tests. The two scores were added together and this combined raw-score was used in all computations. This would in effect produce a longer test and a more reliable measure. Four subtests from each Battery were selected for administration to all pupils: Word Meaning, Paragraph Meaning, Word Study Skills, and Spelling. The two tests were administered in May 1967, following the completion of a 161 day experimental period.

Inspection of the frequency distributions from the two tests administered at the end of the third year indicated that on the Primary II Battery, pupils at the low ability score level tended to score more toward the middle of the range, while pupils at the high ability score level tended to score even closer to the top of the range. On the Intermediate I Battery, pupils at the low ability score level tended to score from the lower end of the range to the middle, while scores for pupils at the high ability score level tended to spread from the middle of the range to the upper end.

The use of combined scores provided a measure that was more evenly spread throughout the range of scores than either of the two batteries alone. The combined scores for the Stanford II Battery and the Intermediate I Battery were therefore used as the criterion measures for the total sample. All references to Stanford test scores throughout the remainder of this section of the report will refer to the combined scores as noted above.

The raw-score means, standard deviations, and analysis of variance F ratios for the combined raw-scores based upon split-class means as the statistical unit for the four Stanford subtests are shown in Appendix E.

Of the four subtests, only the raw-score means for Word Study Skills differed significantly between treatments. The pupils in the basal reader group demonstrated a greater mastery of the phonic skills measured in this test. The difference was significant at the .01 level. The differences among ability score level raw-score means were significant at the .01 level. Girls had significantly higher Spelling scores. The difference was significant at the .05 level. The only significant interaction was for treatment by ability score level on the Paragraph Meaning subtest. The difference was significant at the .05 level.

The raw-score means were adjusted for initial differences on the five predictor variables by analysis of covariance, which allowed for the effect of the relevant variables. A summary of the analysis of covariance F ratios is presented in Table 47. The results of the covariance analysis for each of the four Stanford subtests are considered separately below. The Newman-Keuls sequential range test was used for multiple comparisons of adjusted means (Winer, 1962).

Table 47

ANALYSIS OF COVARIANCE *F* RATIOS FOR COMBINED STANFORD ACHIEVEMENT SUBTESTS, GRADE 3
(Split-Class Mean as Unit)

Source of Variation	df	Combined Stanford Subtests			
		Word Meaning	Paragraph Meaning	Spelling	Word Study Skills
Treatment (T)	1,27	0.78	0.28	2.01	6.44*
Ability Score Level (A)	2,27	8.95**	9.93**	8.50**	8.06**
Sex (S)	1,27	0.00	0.05	7.07*	0.99
T x A	2,27	0.72	0.67	0.41	1.36
T x S	1,27	0.01	0.01	0.79	0.10
A x S	2,27	0.57	0.03	0.22	0.47
T x A x S	2,27	0.32	0.09	0.80	0.34

Stanford Word Meaning Subtest

The combined Word Meaning subtest consists of 74 multiple choice items, graduated in difficulty, measuring pupil ability to read a sentence and to select a correct word to complete the sentence. There are 36 items in the Primary II Battery and 38 items in the Intermediate I Battery.

Table 48 shows the adjusted means for the combined Stanford Word Meaning subtests. There were no significant differences between treatments or sexes. Differences among ability score levels were significant at the .01 level, with pupils at the high ability score level having the highest total adjusted mean score and pupils at the average ability score level having the lowest mean score. None of the interactions was significant (see Table 47).

Stanford Paragraph Meaning Subtest

The combined Paragraph Meaning subtest consists of a series of paragraphs, graduated in difficulty, from which one or more words are omitted. The pupil demonstrates his comprehension of the paragraph by selecting from among four choices the proper word for each omission. The combined subtests include 120 items, 60 items from each of the two batteries.

The adjusted mean scores for the combined subtests are presented in Table 49. Of the main effects, only the adjusted mean differences among ability score levels were significant. These differences were significant at the .01 level.

Stanford Spelling Subtest

The combined Spelling subtests consists of 80 items. The 30 items from the Primary II Battery are dictation type items, while the 50 items from the Intermediate I Battery are multiple-choice items in which the pupil selects from among four words the one which is spelled incorrectly. While the two subtests measure spelling in different ways, the manual indicates that the two types of measures are highly correlated.

Table 50 presents the adjusted means for the combined Stanford Spelling subtests. The difference between adjusted means for treatments were not significantly different. At the .05 level the girls

Table 48

ADJUSTED MEANS FOR COMBINED STANFORD WORD MEANING SUBTEST, GRADE 3

Ability Score Level	Sex	Basal Reader Approach N (Split Class Means)	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N (Split-Class Means)	Total Mean	
	Boys	4	43.01		40.47	4		
High	Girls	4	42.18		40.00	4	41.41	←
	Cell Total	8	42.59	←NS→	40.23	8		
	Boys	3	34.90		32.15	4		
Average	Girls	3	32.37		32.51	4	32.89	.01
	Cell Total	6	33.64	←NS→	32.33	8		
	Boys	4	33.72		35.85	3		
Low	Girls	4	36.40		36.62	3	35.56	←
	Cell Total	8	35.06	←NS→	36.23	6		
Total	Boys	11	37.42		36.18	11	36.80	← NS
	Girls	11	37.40		36.35	11	36.88	←
Total Treatment		22	37.41	←NS→	36.27	22		

Significance levels corresponding to F's shown on Table 47 are indicated by arrows for selected comparisons.

Table 49

ADJUSTED MEANS FOR COMBINED STANFORD PARAGRAPH MEANING SUBTEST, GRADE 3

Ability Score Level	Sex	Treatments: Basal Reader Approach N (Split-Class Means)	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N (Split-Class Means)	Total Mean	
High	Boys	4	68.96		69.07	4		
	Girls	4	69.06		69.70	4	69.20 ←	
	Cell Total	8	69.01	←NS→	69.38	8		
Average	Boys	3	56.59		54.65	4		
	Girls	3	55.24		55.58	4	55.46	.01
	Cell Total	6	55.92	←NS→	55.12	8		
Low	Boys	4	55.48		60.50	3		
	Girls	4	57.03		60.63	3	58.10 ←	
	Cell Total	8	56.25	←NS→	60.56	6		
Total	Boys	11	60.69		61.49	11	61.09 ←	NS
	Girls	11	60.92		62.09	11	61.50 ←	
Total Treatment		22	60.80	←NS→	61.79	22		

Significance levels corresponding to F's shown on Table 47 are indicated by arrows for selected comparisons.

Table 50

ADJUSTED MEANS FOR COMBINED STANFORD SPELLING SUBTEST, GRADE 3

		Treatments						
		Basal Reader Approach			Linguistic Approach			
Ability Score Level	Sex	N (Split-Class Means)	Mean		Mean	N (Split-Class Means)	Mean	
High	Boys	4	34.13		37.07	4		
	Girls	4	40.89		41.43	4	38.38	←
	Cell Total	8	37.51	←NS—	39.25	8		
Average	Boys	3	34.73		34.58	4		
	Girls	3	34.12		41.09	4	36.37	.01
	Cell Total	6	34.43	←NS—	37.83	8		
Low	Boys	4	43.68		46.67	3		
	Girls	4	45.47		52.84	3	46.79	←
	Cell Total	8	44.58	←NS—	49.75	6		
Total	Boys	11	37.76		38.78	11	38.27	← .05
	Girls	11	40.71		44.42	11	42.56	←
Total Treatment		22	39.24	←NS—	41.60	22		

Significance levels corresponding to F's shown on Table 47 are indicated by arrows for selected comparisons.

achieved significantly higher performance levels than did the boys. The differences among ability score levels were significant at the .01 level. (See Table 47.) None of the interactions was significant.

Stanford Word Reading Skills Subtest

The combined subtests consist of 125 multiple choice items. The 64 items in the Primary II Battery are broken down into two parts: Beginning and Ending Sounds in Part A and Visual Phonics in Part B. The 61 items used in the Intermediate I Battery include: Phonic patterns used in word recognition and Syllabication.

The adjusted means for the combined Word Study Skills subtests are shown in Table 51. Pupils in the basal reader treatment achieved significantly higher adjusted mean scores. The treatment difference was significant at the .05 level. There were significant differences at the .01 level among ability score levels. None of the interactions was significant. (See Table 47).

Analysis of Criterion Measures for Subsamples

Oral Reading Tests

Two oral reading measures were administered individually to a sample of pupils drawn at random from each treatment group. A table of random numbers was used for drawing the random samples from among the three ability score levels. There were 89 pupils in the subsample, including 45 pupils from the linguistic treatment and 44 pupils from the basal reader treatment. There were 14 pupils from the high basal reader group and 15 from each of the other ability score levels in each treatment. The two oral reading tests were: The Gilmore Oral Reading Test and the Gates Word Pronunciation Test.

The Gilmore Oral Reading Test consists of a series of paragraphs which are read aloud from a test booklet while the examiner records pupil errors. The test is scored for Accuracy expressed as a grade-level score, and for Rate in terms of words read per minute.

The Gates test contains 40 words of increasing

Table 51

ADJUSTED MEANS FOR COMBINED STANFORD WORD STUDY SKILLS SUBTEST, GRADE 3

Ability Score Level	Sex	Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
		N (Split-Class Means)	Mean		Mean	N (Split-Class Means)	Mean	
High	Boys	4	73.96		66.29	4		
	Girls	4	77.16		71.18	4	72.15	←
	Cell Total	8	75.56	← NS →	68.74	8		
Average	Boys	3	66.64		58.83	4		
	Girls	3	65.14		61.48	4	62.61	.01
	Cell Total	6	65.89	← NS →	60.16	8		
Low	Boys	4	68.68		70.28	3		
	Girls	4	70.18		68.93	3	69.50	←
	Cell Total	8	69.43	← NS →	69.60	6		
Total	Boys	11	70.04		64.67	11	67.35	← NS
	Girls	11	71.34		67.04	11	69.19	←
Total Treatment		22	70.69	← .05 →	65.85	22		

Significance levels corresponding to F's shown on Table 47 are indicated by arrows for selected comparisons.

difficulty which are based upon frequency of occurrence. The total raw-score is the number of words pronounced correctly.

The raw-score means and standard deviations and analysis of variance results for the three oral reading measures administered at the end of grade 3, are shown in Appendix F.

There was no significant difference between the raw-score means for treatments. The differences among ability score levels were significant at the .01 level. Pupils at the high ability score level obtained the higher raw-score mean while pupils at the low ability score level obtained the lowest. Sex differences favoring the girls were significant at the .01 level for the _Gates_ test score and the _Gilmore_ Accuracy score, and were significant at the .05 level for the _Gilmore_ Rate score. The only significant interaction (.05 level) was for treatment by ability score level for the _Gilmore_ Accuracy score.

The raw-score means were adjusted for initial differences on pre-experimental reading readiness and intelligence scores. The adjusted means for the three oral reading measures at the end of grade 3 are shown in Tables 52, 53, and 54, and the analysis of covariance _F_ ratios are reported in Table 55.

Pupils in the linguistic group obtained significantly higher adjusted mean scores for _Gilmore_ Rate. This difference was significant at the .05 level. Differences between adjusted mean scores for girls and boys were not significant. None of the interactions was significant.

Writing Samples

The creative writing skills for pupils in the subsample were also evaluated. Pupils were asked to write an ending for a story for which the beginning portion was read aloud by the teacher. (A sample set of directions for the writing sample given in grade 3 is shown in Appendix H.) No help was provided by the teacher in spelling or in sentence structure. The stories were evaluated by project staff members on the basis of the following criteria:

1. Running Words (a count of all words in the child's story)

Table 52

ADJUSTED MEANS FOR GILMORE ORAL READING TEST, ACCURACY, GRADE 3
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N	 Mean		 Linguistic Approach Mean	 N	Total Mean	
	Boys	4	55.06		41.54	5		
High	Girls	10	47.61		44.98	10	46.68	←
	Cell Total	14	49.74	← NS —	43.83	15		
	Boys	9	40.36		39.36	7		
Average	Girls	6	55.64		45.20	8	44.47	NS
	Cell Total	15	46.47	← NS —	42.48	15		
	Boys	8	39.29		44.04	8		
Low	Girls	7	40.12		47.49	7	42.67	←
	Cell Total	15	39.68	← NS —	45.65	15		
Total	Boys	21	42.75		41.78	20	42.28	← NS
	Girls	23	47.43		45.75	25	46.55	←
Total Treatment		44	45.20	← NS —	43.99	45		

Significance levels corresponding to F's shown on Table 55 are indicated by arrows for selected comparisons.

Table 53

ADJUSTED MEANS FOR GILMORE ORAL READING TEST RATE, GRADE 3
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total Mean	
	Boys	4	77.09		87.50	5		
High	Girls	10	90.80		106.20	10	93.65	←┐
	Cell Total	14	86.88	←NS→	99.97	15		│
	Boys	9	98.60		107.88	7		│
Average	Girls	6	106.05		107.08	8	104.52	NS
	Cell Total	15	101.58	←NS→	107.45	15		│
	Boys	8	100.48		116.33	8		│
Low	Girls	7	100.01		128.74	7	111.19	←┘
	Cell Total	15	100.26	←.05→	122.12	15		
Total	Boys	21	95.22		106.16	20	100.56	←┐ NS
	Girls	23	97.58		112.79	25	105.50	←┘
Total Treatment		44	96.45	←.05→	109.85	45		

Significance levels corresponding to F's shown on Table 55 are indicated by arrows for selected comparisons.

Table 54

ADJUSTED MEANS FOR GATES WORD PRONUNCIATION TEST, GRADE 3
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments					Total	
		Basal Reader Approach			Linguistic Approach			
		N	Mean		Mean	N	Mean	
High	Boys	4	28.00		27.30	5	27.65 ←	
	Girls	10	26.34		28.99	10		
	Cell Total	14	26.81 ←	NS	→ 28.43	15		
Average	Boys	9	23.75		26.49	7	26.96	NS
	Girls	6	30.88		28.06	8		
	Cell Total	15	26.60 ←	NS	→ 27.33	15		
Low	Boys	8	24.68		26.74	8	25.51 ←	
	Girls	7	23.15		27.41	7		
	Cell Total	15	23.97 ←	NS	→ 27.05	15		
Total	Boys	21	24.91		26.79	20	25.83 ←	NS
	Girls	23	26.55		28.25	25	27.44 ←	
Total Treatment		44	25.77 ←	NS	→ 27.60	45		

Significance levels corresponding to F's shown on Table 55 are indicated by arrows for selected comparisons.

Table 55

ANALYSIS OF COVARIANCE F RATIOS FOR ORAL READING TESTS, GRADE 3 (Individual Pupil Score as Unit)

Source of Variation	df	Gilmore Accuracy	Gilmore Rate	Gates
Treatment (T)	1,72	0.26	5.69*	1.43
Ability Score Level (A)	2,72	0.10	0.83	0.17
Sex (S)	1,72	2.51	0.75	1.11
T x A	2,72	2.31	0.75	0.33
T x S	1,72	0.02	0.15	0.00
A x S	2,72	1.68	0.55	1.01
T x A x S	2,72	1.23	0.32	0.89

*Significant at the .05 level.

**Significant at the .01 level.

2. Different Words (words appearing more than once are counted as one word)

3. Spelling (a count of all words spelled correctly)

4. Polysyllabic Words (a count of all words of more than one syllable)

5. Mechanics-Ratio score (percentage of accuracy computed for appropriate use of capitalization, punctuation, and indentation).

The raw-score means, standard deviations, and analyses of variance values for the five variables on the writing sample obtained for the subsample at the end of grade 3 are reported in Appendix F.

Pupils in the linguistic group had significantly higher raw-score means for number of Running Words and Spelling. These differences were significant at the .05 level. Differences among raw-score means for ability score levels were significant at the .01 level for all five variables. Girls obtained significantly higher raw-score means for all five variables. These differences were significant at the .01 level. Interactions between treatments and ability score levels were significant for Running Words and Different Words at the .01 level and at the .05 level for Spelling. There were significant sex by ability score level interaction at the .05 level for Different Words and for Spelling. These significant interactions indicate that differences between treatments were not consistent at all ability score levels and that differences between sexes were not consistent at all ability score levels.

The raw-score means at the end of grade 3 were adjusted for initial differences on the five predictor variables. Tables 56, 57, 58, 59 and 60 show the adjusted means. The analysis of covariance _F_ ratios for adjusted means are reported in Table 61. The interactions are graphed in Figures 15, 16, 17, 18 and 19.

Pupils in the linguistic group achieved significantly superior adjusted mean scores for the Running Words. This difference was significant at the .05 level. None of the other differences between adjusted means for treatments was significant for the four other writing sample variables. Adjusted mean scores among ability score levels were not significantly dif-

Table 56

ADJUSTED MEANS FOR WRITING SAMPLE, RUNNING WORDS, GRADE 3
(Individual Pupil Score as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
High	Boys	4	58.88		100.85	5	121.60 ←	┐
	Girls	10	117.71		160.97	10		
	Cell Total	14	100.90	←.05→	140.93	15		
Average	Boys	9	65.51		48.46	7		
	Girls	6	137.79		118.19	8	90.03	NS
	Cell Total	15	94.42	← NS →	85.65	15		
Low	Boys	8	72.76		103.95	8		
	Girls	7	70.41		121.69	7	91.95 ←	┘
	Cell Total	15	71.66	←.05→	112.23	15		
Total	Boys	21	67.01		83.75	20	75.18 ←	.01
	Girls	23	108.55		136.28	25	122.99 ←	
Total Treatment		44	88.72	←.05→	112.94	45		

Significance levels corresponding to F's shown on Table 61 are indicated by arrows for selected comparisons.

Figure 15

ADJUSTED MEANS FOR WRITING SAMPLE,
RUNNING WORDS, GRADE 3

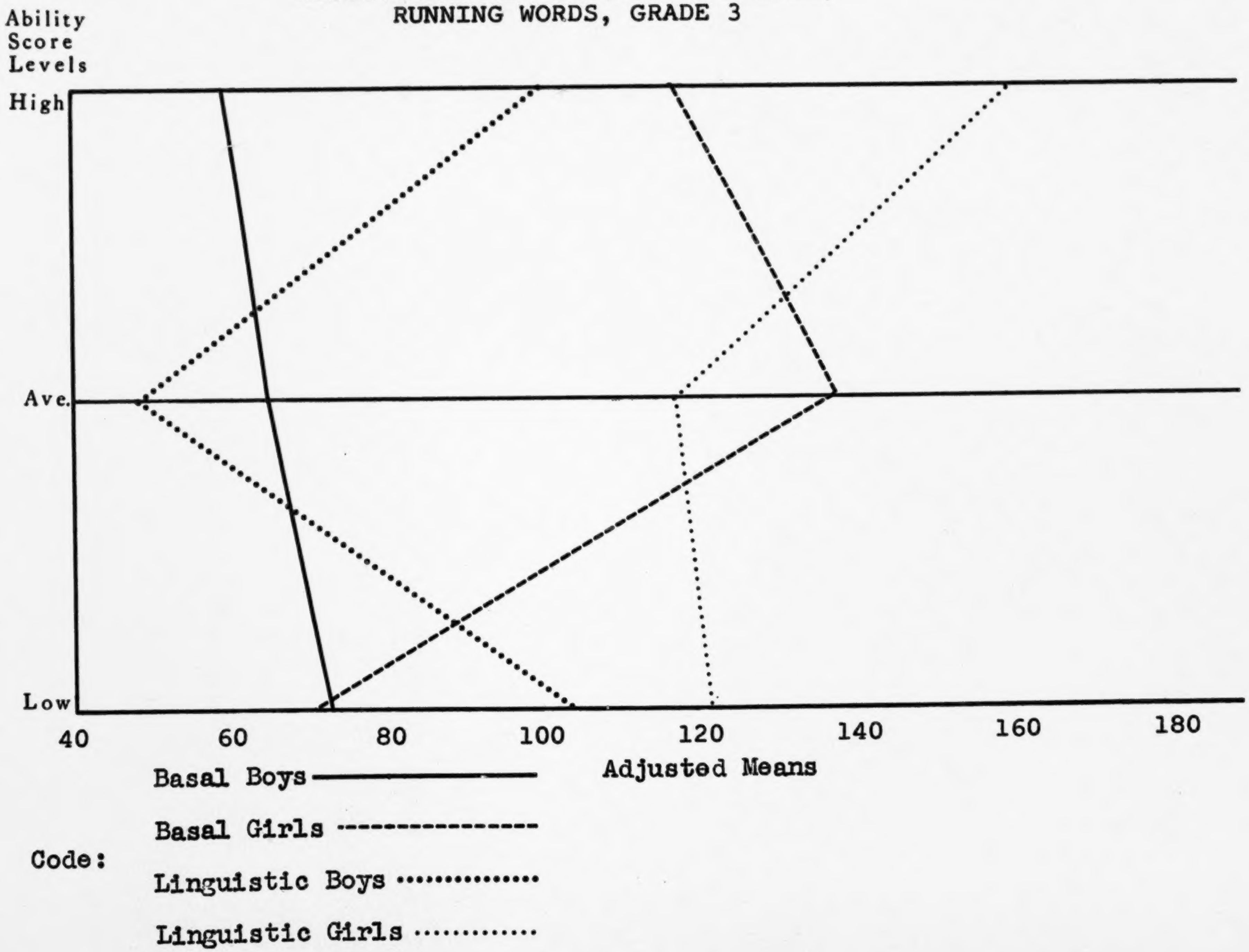


Table 57

ADJUSTED MEANS FOR WRITING SAMPLE, DIFFERENT WORDS, GRADE 3
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N	 Mean		 Linguistic Approach Mean	 N	Total Mean	
High	Boys	4	30.76		47.23	5		
	Girls	10	63.76		73.49	10	59.71 ←	
	Cell Total	14	54.33	←NS→	64.74	15		
Average	Boys	9	35.68		29.15	7		
	Girls	6	72.98		54.88	8	46.74	NS
	Cell Total	15	50.60	←NS→	42.87	15		
Low	Boys	8	42.52		55.05	8		
	Girls	7	44.55		55.41	7	49.34 ←	
	Cell Total	15	43.46	←NS→	55.22	15		
Total	Boys	21	37.35		44.03	20	40.61 ←	.01
	Girls	23	60.32		62.47	25	61.44 ←	
Total Treatment		44	49.35	←NS→	54.28	45		

Significance levels corresponding to F's shown on Table 61 are indicated by arrows for selected comparisons.

Figure 16

ADJUSTED MEANS FOR WRITING SAMPLE, DIFFERENT WORDS, GRADE 3

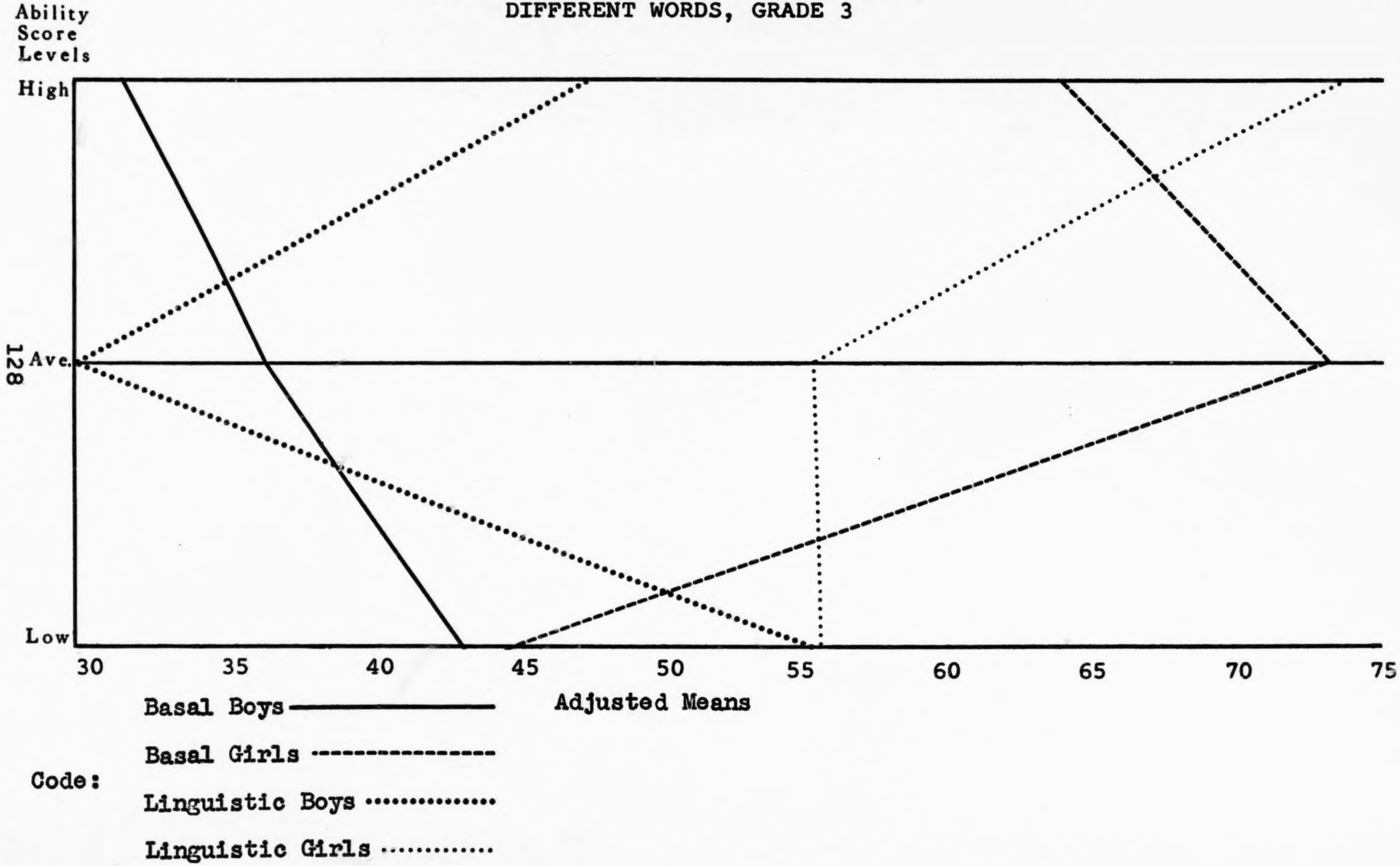


Table 58

ADJUSTED MEANS FOR WRITING SAMPLE, SPELLING, GRADE 3
(Individual Pupil Score as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
	Boys	4	61.73		93.45	5		
High	Girls	10	114.70		155.75	10	117.88	
	Cell Total	14	99.56	← .05 →	134.98	15		
	Boys	9	53.05		38.91	7		
Average	Girls	6	125.60		106.99	8	78.65	NS
	Cell Total	15	82.07	← NS →	75.22	15		
	Boys	8	61.42		74.44	8		
Low	Girls	7	55.89		101.84	7	73.03	
	Cell Total	15	58.84	← NS →	87.23	15		
Total	Boys	21	57.89		66.76	20	62.22	.01
	Girls	23	99.64		125.05	25	112.88	
Total Treatment		44	79.72	← NS →	99.14	45		

Significance levels corresponding to F's shown on Table 61 are indicated by arrows for selected comparisons.

Figure 17

ADJUSTED MEANS FOR WRITING SAMPLE, SPELLING, GRADE 3

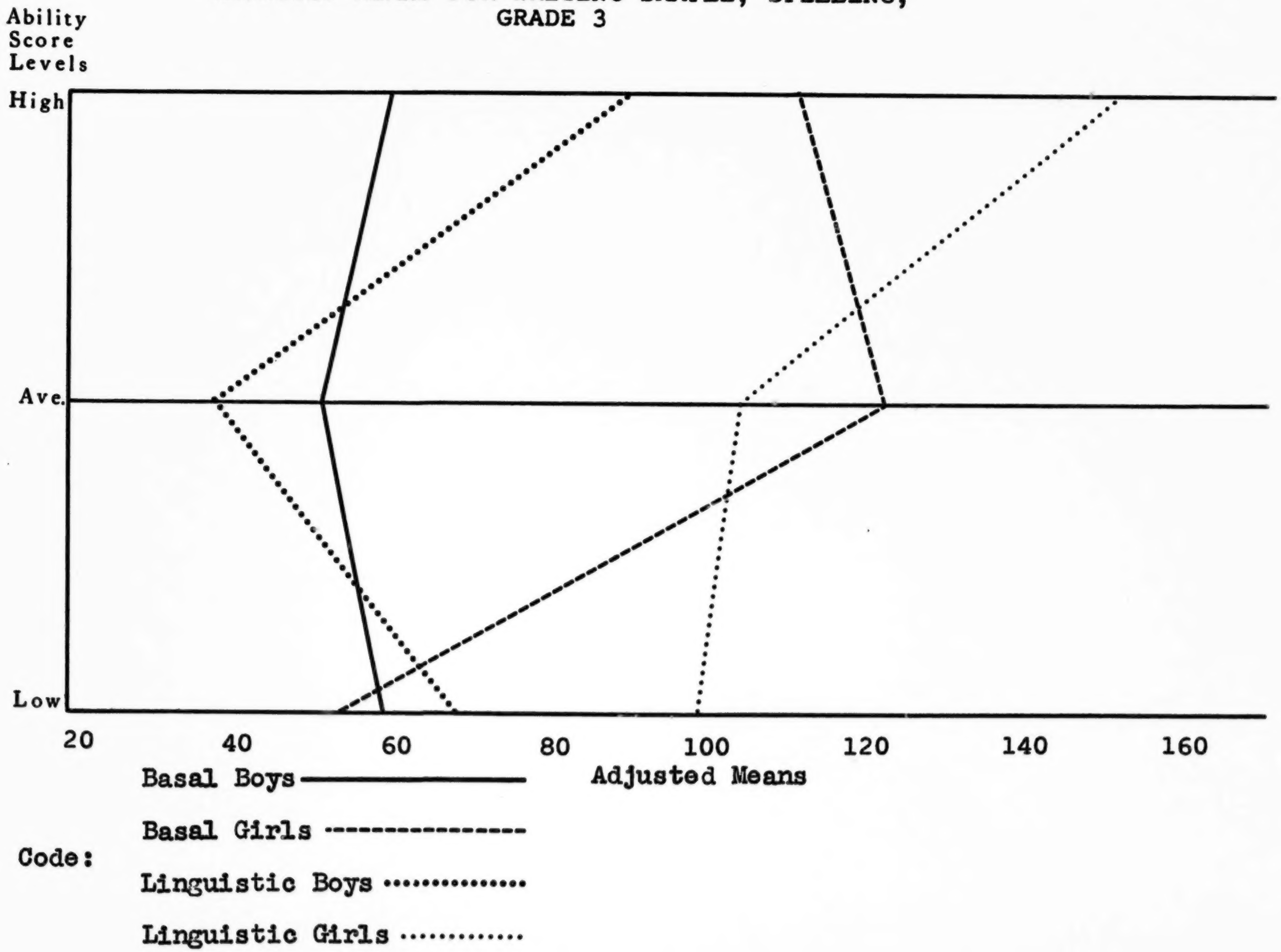


Table 59

ADJUSTED MEANS FOR WRITING SAMPLE, POLYSYLLABIC WORDS, GRADE 3
(Individual Pupil Score as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
High	Boys	4	4.27		13.05	5		
	Girls	10	20.26		23.27	10	17.85 ←	
	Cell Total	14	15.69	←NS→	19.86	15		
Average	Boys	9	7.58		8.20	7		
	Girls	6	19.11		19.85	8	13.30 NS	
	Cell Total	15	12.19	←NS→	14.41	15		
Low	Boys	8	15.20		16.74	8		
	Girls	7	14.86		22.11	7	17.15 ←	
	Cell Total	15	15.04	←NS→	19.25	15		
Total	Boys	21	9.85		12.83	20	11.31 ←	.01
	Girls	23	18.31		21.85	25	20.16 ←	
Total Treatment		44	14.28	←NS→	17.84	45		

Significance levels corresponding to F's shown on Table 61 are indicated by arrows for selected comparisons

Figure 18

ADJUSTED MEANS FOR WRITING SAMPLE, POLYSYLLABIC WORDS,
GRADE 3

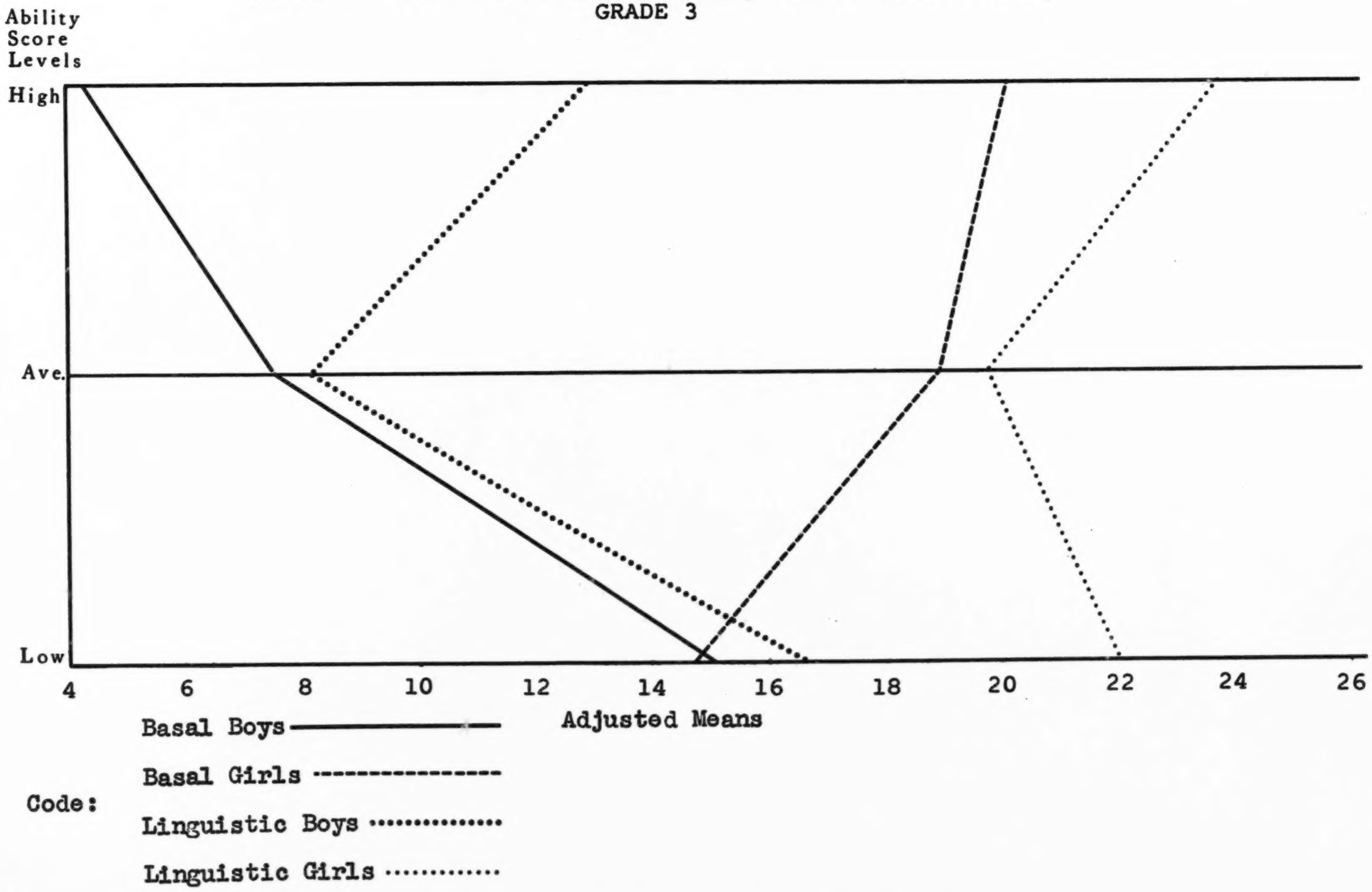


Table 60

ADJUSTED MEANS FOR WRITING SAMPLE, MECHANICS-RATIO, GRADE 3
(Individual Pupil Score as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
High	Boys	4	73.25		66.33	5	71.33 ←	
	Girls	10	70.74		73.66	10		
	Cell Total	14	71.46	← NS —	71.22	15		
Average	Boys	9	47.74		75.04	7		
	Girls	6	54.19		60.68	8	58.85	NS
	Cell Total	15	50.32	← .05 —	67.38	15		
Low	Boys	8	60.50		49.70	8		
	Girls	7	73.04		70.57	7	62.90 ←	
	Cell Total	15	66.35	← NS —	59.44	15		
Total	Boys	21	57.46		62.72	20	60.03 ←	NS
	Girls	23	67.12		68.64	25	67.91 ←	
Total Treatment		44	62.51	← NS —	66.01	45		

Significance levels corresponding to F's shown on Table 61 are indicated by arrows for selected comparisons.

Figure 19

ADJUSTED MEANS FOR WRITING SAMPLE, MECHANICS-RATIO, GRADE 3

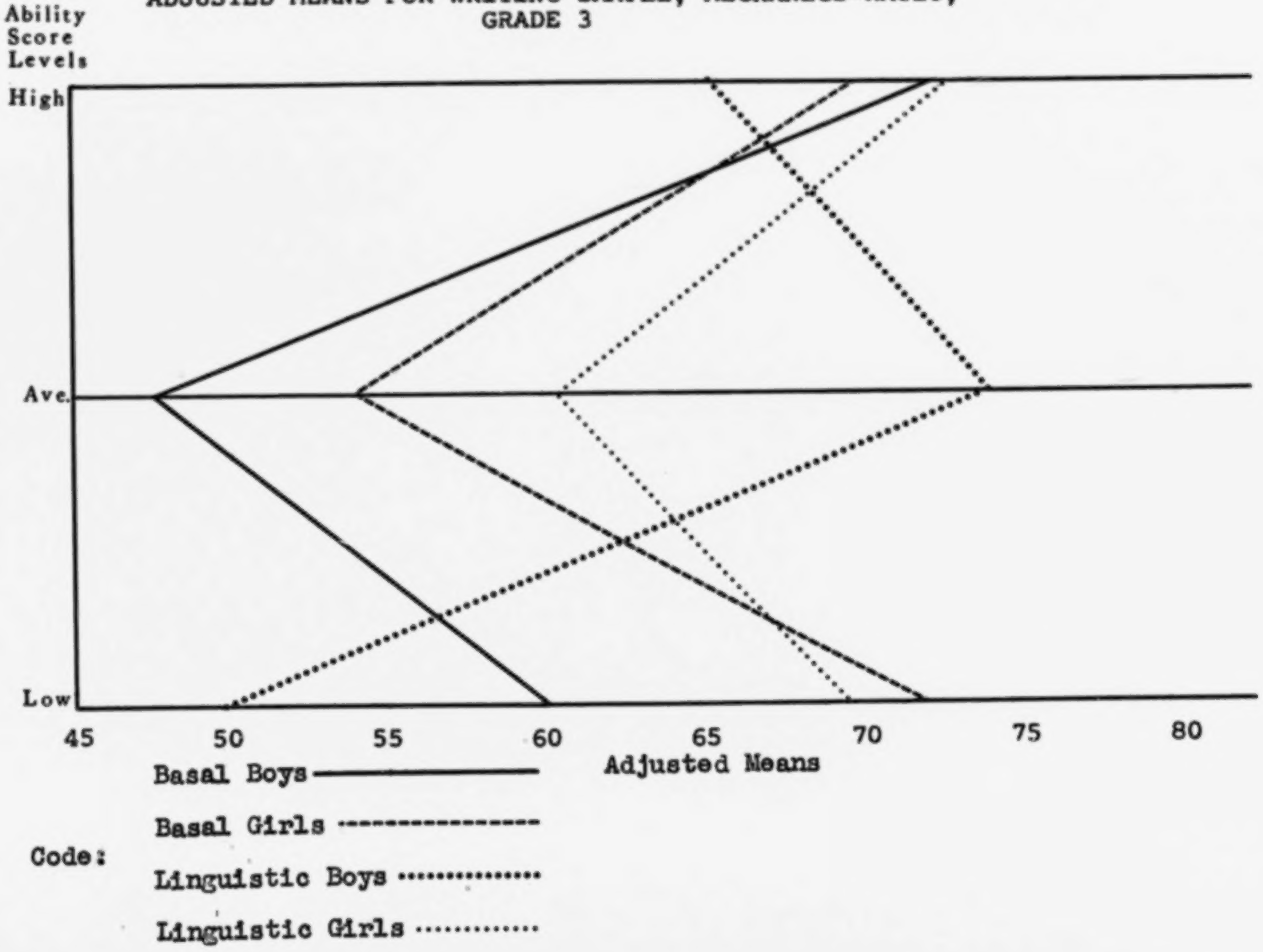


Table 61

ANALYSIS OF COVARIANCE F RATIOS FOR WRITING SAMPLE, GRADE 3 (Individual Pupil Score as Unit)

Source of Variation	df	Running Words	Different Words	Spelling	Polysyllabic Words	Mechanics Ratio
Treatment (T)	1,72	5.26•	1.00	3.74	3.04	0.59
Ability Score Level (A)	2,72	0.87	0.82	1.58	1.41	1.49
Sex (S)	1,72	22.21••	22.90••	28.78••	21.02••	3.29
T x A	2,72	4.09•	3.81•	3.17•	0.47	3.04
T x S	1,72	0.32	0.30	0.84	0.02	0.20
A x S	2,72	3.63•	5.09••	3.66•	2.96	1.95
T x A x S	2,72	0.13	0.12	0.37	0.77	1.41

•Significant at the .05 level.

••Significant at the .01 level.

ferent for any of the five variables obtained from the writing samples. Girls demonstrated significantly superior performance on four of the five variables. These differences, significant at the .01 level, were for Running Words, Different Words, Spelling and Polysyllabic Words.

Interactions between adjusted means for treatments and ability score levels were significant at the .05 level for Running Words, Different Words, and Spelling. Differences between treatments were not consistent at all ability score levels. There were significant sex by ability score level interactions at the .05 level on variables for Running Words and Spelling and at the .01 level for Different Words. These interactions indicated that sex differences were inconsistent at the various ability score levels. Figures 15 through 19 present the interactions graphically. An illustration of the significant treatment by ability score level interaction can be seen by examination of Table 56 and Figure 15 for Running Words. The significant treatment by ability score level interaction was characterized by superiority of the linguistic group at the high and low ability score levels -- significant at the .05 level in both instances -- while differences between treatments at the average ability score level were not significant. The sex by ability score level interaction is also shown in Table 56 and Figure 15. This interaction is characterized at the high ability score level by superiority of girls in both treatments, while at the low ability score level only the performance of the girls in the linguistic group exceeds the performance of the boys in both treatments. Inconsistencies for the other variables for which there was significant interaction can be seen by inspection of the appropriate tables and figures.

CHAPTER V

SUMMARY, CONCLUSIONS, AND DISCUSSION

The investigation discussed in this report is a continuation of the Cooperative Research Program studies in First Grade Reading Instruction sponsored by the U.S. Office of Education. This report presents the results of the analysis of data collected at the end of the second grade and at the end of the third grade. The findings from the first-grade phase of the investigation were presented in a previous report (Schneyer, Schultz, and Cowen, 1966).

The major objective of this study was to compare the achievement of second-grade and third-grade pupils (at above average, average, and below average ability score levels) who were initially taught to read by a linguistic approach with the achievement of pupils (at above average, average, and below average ability score levels) who were initially taught to read by a basal reader approach. The linguistic approach in the initial phase of instruction was based upon linguistic principles presented in Linguistics in Reading by Charles C. Fries (1963) The materials used in this approach consisted of a reading series entitled A Basic Reading Series Developed upon Linguistic Principles, produced by Fries and three associates (1963-65). After completing the linguistic materials, these pupils continued receiving instruction using the basal readers published by Houghton Mifflin. Pupils in the basal reader treatment used the reading materials in the basal series published by Scott, Foresman.

There were 22 classes of pupils in the School District of Philadelphia involved in the project, with one class in each of 22 different schools. In the basal reader treatment group, there were 11 classes, with 4 classes at the high and low ability score levels, and three classes at the average ability score level. In the linguistic treatment group, there were 11 classes, with 4 classes at the high and average ability score levels, and 3 at the low ability score level. Within ability score levels, classes and teachers were randomly assigned to treatments. The pupils in the 22 classes were grouped for analysis purposes into a 2 x 3 x 2 factorial design: treatment by ability score level by sex.

Pre-experiment reading readiness and intelligence testing was completed in September 1964 prior to the initiation of the first-grade phase of the investigation. Data from these measures were recalculated for pupils available in the second- and third-grade phases of the study. Additional data for attendance were obtained for each year. During the second-grade study, teachers recorded information concerning the independent reading of pupils. Data pertaining to teacher characteristics were also collected during each year for attendance, years of teaching experience, age, and performance rating.

Tests for evaluating final achievement were administered in May 1966 and in May 1967. The Stanford Achievement Test was administered to all pupils in the total sample. Individual oral reading tests and creative writing measures were administered to randomly drawn subsamples from each of the treatment groups. The data from the Stanford Achievement Tests were analyzed using class means (split on the basis of sex) as the basic unit of analysis. The subsample data were analyzed using individual pupil scores as the basic unit of analysis.

The summary of results is presented below.

Results

Summary of Results for Predictor Variables, Grade 2

1. When all pupils in the linguistic treatment group were compared with all pupils in the basal reader group, there were significant differences between raw-score means favoring pupils in the basal reader group for: Metropolitan total reading readiness scores; and Murphy-Durrell readiness subtest scores for Phonemes and Letter Names. There were no significant differences between treatments for the Murphy-Durrell Learning Rate or for the Pintner-Cunningham total raw score for intelligence.

2. There were significant differences at the .01 level among ability score levels on all of the readiness measures and for intelligence. The high ability score level had the highest mean score in all cases.

3. There were no significant differences between raw-score means for sexes for any of the readiness measures or for intelligence.

4. The only significant interaction was for treatment by ability score level on the Murphy-Durrell subtest for Letter Names.

5. There were no significant differences between treatments or between sexes, for mean number of days absent. Differences among ability score levels and raw-score means were significant at the .05 level with pupils at the high ability score level having the greatest number of absences.

6. Teacher ratings of pupil interest in reading showed no significant differences between treatments for Eagerness to Read or Maturity of Reading Choices. Girls were rated significantly higher in Eagerness to Read.

7. Median within-cell correlations between predictor variables and final achievement measures for readiness and intelligence ranged from .31 to .38.

8. Pupils in the linguistic treatment group read completely a significantly greater number of books. There were no significant differences in the number of books read partially.

9. The number of books read partially or completely was not significantly different between boys and girls.

10. None of the interactions for number of books read partially or completely was significant.

11. For teacher characteristics, there were significant differences between means for teachers in the two treatments for age, years of teaching experience, and number of days absent. Teachers in the basal reader group were significantly older and more experienced, while teachers in the linguistic group were absent a significantly greater number of days. There were no significant differences between mean teacher ratings for the two treatment groups.

12. There were significantly different means among teachers at the three ability score levels for all characteristics except rating of teacher performance. The teachers working with pupils at the high ability score level tended to have the higher means.

13. The correlations between various teacher characteristics and final achievement of pupils on the Stanford subtests ranged from +.02 to -.08.

Summary of Results for Criterion Variables for Total Sample, Grade 2

The major objective of the investigation, a comparison of the achievement of pupils at the end of grade 2 who initially learned to read under the two approaches to reading instruction, was pursued by testing four null hypotheses. The data for testing these hypotheses were based upon five criterion measures administered to the total sample. The criterion measures consisted of five subtests of the Stanford Achievement Test, Primary Battery II: (1) Word Meaning; (2) Paragraph Meaning; (3) Spelling; (4) Word Study Skills; and (5) Language. The raw-score means for each of the subtests were adjusted by analysis of covariance procedures for initial differences using five relevant covariates for reading readiness, intelligence, and number of books completely read by pupils. The hypotheses and pertinent data for each are reported below.

Hypothesis 1. There is no significant overall difference between the reading achievement of second-grade pupils initially taught to read by a linguistic approach and the reading achievement of second-grade pupils initially taught to read by a basal reader approach. Hypothesis 1 was tested by the F ratio for treatment effects.

When all pupils in the total treatment groups were compared, the children in the basal reader group had significantly higher adjusted mean scores for the Stanford subtests for Spelling and Word Study Skills. The differences on the Spelling subtest were significant at the .05 level and on the Word Study Skills subtest, the differences were significant at the .01 level. Differences between treatment groups were not significant for Word Meaning, Paragraph Meaning, or Language.

Hypothesis 2. There is no significant difference between the reading achievement of second-grade pupils initially taught to read by a linguistic approach and the reading achievement of second-grade pupils initially taught to read by a basal reader approach at high, average, or low ability score levels. Hypothesis 2 was tested by the Newman-Keuls procedure for testing significance of the differences between adjusted means for the two treatments at each of the three ability score levels.

At the high ability score level, there were significant differences between adjusted means for treatments at the .05 level on the Spelling subtest, and at the .01 level on the Word Study Skills subtest. The differences on both subtests favored pupils in the basal reader approach. Differences between means were not significant for Word Meaning, Paragraph Meaning,or Language subtests.

At the average ability score level, there were significant differences between adjusted means at the .05 level for the Paragraph Meaning and Spelling subtests, and at the .01 level for Language subtest. The pupils using the basal reader approach had the highest adjusted means in all three instances. Differences on the Word Meaning and Word Study Skills subtests were not significant.

At the low ability score level, none of the adjusted mean differences between treatments was significant for any of the five subtests.

Hypothesis 3. There is no significant difference between the reading achievement of second-grade boys and the reading achievement of second-grade girls initially taught to read by a linguistic approach and by a basal reader approach. Hypothesis 3 was tested by the *F* test for sex effects.

None of the differences between adjusted-mean scores for boys and girls was significant for any of the five subtests of the *Stanford*.

Hypothesis 4. There is no significant interaction between treatments and ability score levels in the reading achievement of second-grade pupils initially taught to read by a linguistic approach and by a basal reader approach. Hypothesis 4 was tested by *F* tests for treatment by ability score level interaction.

There were significant treatment by ability score level interactions for the Word Study Skills subtest at the .01 level and for the Language subtest at the .05 level. On the Word Study Skills subtest, the significant interaction was characterized by superiority of the basal reader treatment group at the high ability score level while the performance of the pupils at the other two ability score levels was not significantly different. For the Language subtest, the significant interaction was characterized by superior performance of the basal reader group at the average ability score level, while performance of the other two levels did not differ significantly.

Summary of Results for Criterion Variables for Subsample, Grade 2

There were nine criterion variables obtained for the randomly drawn subsample: (1) the Gilmore Rate score; (2) the Gilmore Accuracy score; (3) the Gates Word Pronunciation test score; (4) the Fry Phonetically Regular Words Oral Reading Test Score; and five measures from the writing sample; (5) Running Words; (6) Different Words; (7) Spelling; (8) Polysyllabic Words; and (9) Mechanics-Ratio score.

The only oral reading measure on which the two treatments differed significantly was for the Gilmore Accuracy of oral reading. Pupils in the basal reader group had an adjusted mean that was significantly higher at the .01 level. The only significant difference among ability score levels was on the Fry test. The pupils at the high ability score level achieved the highest adjustted mean, while the pupils at the average ability score level obtained the lowest mean. The difference among ability score levels was significant at the .05 level. The adjusted means for girls was significantly higher at the .05 level on the Gates and Fry tests. On the Gilmore Accuracy score, the interactions between treatment by ability score levels and ability score levels by sex were significant at the .01 level. Interactions between ability score levels and sex were also significant at the .01 level for the Gates score and at the .05 level on the Fry measure.

None of the adjusted means for treatments on any of the writing sample measures was significant. The differences among ability score levels were significant at the .01 level for all five measures, with pupils at the high ability score level having the highest mean in all instances. Girls obtained adjusted mean scores that were significantly higher at the .05 level on all writing measures except Mechanics-Ratio. Interactions between treatments and sexes were significant at the .05 level for Running Words, Different Words,and Spelling. Ability score level by sex interactions were also significant at the .05 level for those same variables.

Summary of Results for Predictor Variables, Grade 3

1. The only significant differences between raw-score means for treatments was for the Murphy-Durrell Phonemes subtest. This was significant at the .05 level. None of the other raw-score means for the subtest scores on the Murphy-Durrell readiness measures, the Metropoli-

tan total readiness score, or for the total raw-score for intelligence on the Pintner-Cunningham test was significant.

2. There were significant differences at the .01 level among ability score levels for all of the readiness measures and for the intelligence test. The high ability score level had the highest mean score in all cases.

3. None of the sex differences between raw-score means on any of the readiness measures or intelligence test were significant.

4. The only significant interaction was for treatment by ability score level on the Murphy-Durrell Letter Names subtest. This difference was significant at the .05 level.

5. There were no significant differences between raw-score means for treatments or sexes for number of days of pupil absence. Differences among ability score level raw-score means were significant at the .05 level, with pupils at the high ability score level having the greatest number of absences.

6. Median within-cell correlations between predictor variables and final achievement measures for readiness and intelligence ranged from .34 to .49.

7. There were no significant differences among raw-score means for any of the teacher characteristics. Differences among ability score levels for teacher rating were significant at the .05 level, with teachers at the high ability score level classes having the highest rating. None of the treatment by ability score level interactions was significant.

8. The median within-cell correlations between teacher characteristics and pupil achievement scores on posttests ranged from .02 to -.12.

Summary of Results for Criterion Variables for Total Sample, Grade 3

The primary purpose of this study, a comparison of the achievement of pupils at the end of grade 3 who had initially learned to read under two different approaches, was pursued by testing four null hypotheses. The hypotheses were tested by data based upon criterion measures taken by the total sample. Criterion measures consisted of four subtests of the combined _Stanford Achievement Test_, Primary II Battery and Intermediate I Battery; (1) Word Meaning, (2) Paragraph Meaning, (3) Spelling, and (4) Word Study Skills. The raw-score means for each of the subtests for the two treatment groups were adjusted by analysis of covariance procedures for initial differences on five predictor variables for reading readiness and intelligence. The hypotheses and pertinent data are reported below.

Hypothesis 1'. There is no significant overall difference between the reading achievement of third-grade pupils initially taught to read by a linguistic approach and the reading achievement of third-grade pupils initially taught to read by a basal reader approach. Hypothesis 1' was tested by the _F_ ratio for treatment effects.

On the four combined _Stanford_ subtests, the only significant difference for treatments was on the Word Study Skills subtest. Pupils in the basal reader group achieved adjusted means that were significantly higher at the .05 level.

Hypothesis 2'. There is no significant difference between the reading achievement of third-grade pupils initially taught to read by a linguistic approach and the reading achievement of third-grade pupils initially taught to read by a basal reader approach at high, average, or low ability score levels. Hypothesis 2' was tested by the Newman-Keuls procedure for testing significance of differences between adjusted means for the two treatments at each of the three ability score levels.

None of the differences between pairs of means for the two treatments at any of the ability score levels was significant.

Hypothesis 3'. There is no significant difference between the reading achievement of third-grade boys and the reading achievement of third-grade girls initially taught to read by a linguistic approach and by a basal reader approach. Hypothesis 3' was tested by the _F_ test for sex effects.

Girls achieved higher adjusted means on the combined _Stanford_ subtest for Spelling that were significantly different at the .05 level. None of the differences on the other three subtests was significant for sex effects.

Hypothesis 4'. There is no significant interaction between treatments and ability score levels in the achievement of third-grade pupils initially taught to read by a linguistic approach and by a basal reader approach. Hypothesis 4'was tested by F tests for treatment by ability score interaction.

None of the interactions for treatment by ability score levels was significant for any of the four combined Stanford subtests.

Summary of Results for Criterion Variables for Subsample, Grade 3

There were eight criterion variables obtained for the randomly drawn subsample: (1) Gilmore Rate score; (2) the Gilmore Accuracy of Oral Reading score; (3) the Gates Word Pronunciation Test score,and five measures from the writing sample; (4) Running Words; (5) Different Words; (6) Spelling; (7) Polysyllabic Words; and (8) the Mechanics-Ratio score.

The only oral reading variable on which there was a significant difference between adjusted meand for treatments was on the Gilmore Rate score. Pupils in the linguistic group had adjusted mean scores that were significantly higher at the .05 level. None of the other differences between treatments for oral reading measure was significant. None of the adjusted mean differences for sex effects or for interactions was significant.

On the writing sample measures, the pupils in the linguistic group achieved significantly higher adjusted means for Running Words. The difference was significant at the .05 level. There were no significant differences between adjusted means for treatments for any of the other writing measures. The girls achieved adjusted means that were significantly higher at the .01 level for Running Words, Different Words, Spelling, and Polysyllabic Words. There were no differences between means for Mechanics-Ratio score. Interactions between treatments and ability score levels were significant at the .05 level for Running Words, Different Words, and Spelling. Interactions between ability score levels and sexes were significant at the .05 level for Running Words and Spelling, and at the .01 level for Different Words. None of the other interactions was significant.

Conclusions

1. When the two treatment groups are considered as a whole (that is, without breakdown by ability score levels or sexes), and when performance on all of the criterion measures is considered, neither of the two approaches to primary reading instruction proved to be more effective at the end of grade 2 and at the end of grade 3. Although significant differences were found on some of the subskills for reading or related areas as measured in this investigation, neither of the approaches demonstrated superiority in all, or even most, aspects of the reading process.

2. At the end of grade 2, pupils in the basal reader approach demonstrated significantly superior performance in Word Study Skills and Spelling as measured by the *Stanford* test, and in Accuracy of oral reading, as measured by the *Gilmore* test. The two treatment groups did not differ significantly on 11 other criterion measures for silent reading, oral reading, or creative writing.

3. At the end of grade 3, pupils in the linguistic approach achieved significantly superior performance in Rate of oral reading and Running Words, while pupils in the basal reader group were significantly higher in Word Study Skills on the *Stanford* subtest. There were no significant differences in the performance of the two groups on any of the remaining 9 criterion measures for silent reading, oral reading, or creative writing.

4. Girls were significantly better on two of the oral reading measures (*Gates* and *Fry* word lists) and on all of the writing sample measures except Mechanics-Ratio score at the end of grade 2. The girls performed significantly better, at the end of grade 3, in Spelling (*Stanford*) and again on the same four measures of the writing sample. Boys did as well as girls on all other criterion measures.

Discussion

The conclusion that neither of the approaches employed in the present investigation produced superior overall achievement in reading, spelling, or writing skills as measured by tests used in the study deserves some further consideration since there were factors which might have influenced the outcomes. The discussion is organized into the following topics: (1) teacher effectiveness; (2) teacher familiarity with approaches; (3) control of the Hawthorne effect; (4) suitability of standardized reading tests as criterion measures; (5) comparison of class mean and individual analysis; and (6) a consideration of future reading research.

Teacher Effectiveness

It is difficult to assess the effect that the 22 second-grade teachers and the 22 third-grade teachers had upon the results of the experiment. One reason for the difficulty is the wide variation in such teacher characteristics as age, experience, educational background, and teaching efficiency, that existed between teachers in the two treatments and among teachers within respective treatments.

In the original request for volunteer teachers, principals were asked to select their most experienced and qualified teachers from among those who had volunteered to participate in the project. It was hoped that whatever differences existed among those teachers finally selected would be equally distributed through random assignment of teachers to the two treatment groups. A review of the teacher data collected during the two years of the project indicates that this expectation was not entirely realized. There were significant differences in the age and experience of second-grade teachers between treatments and among ability score levels. The older and more experienced teachers tended to be associated with classes using the basal readers and in classes at the high ability score levels. The teachers in the two treatment groups did not differ significantly in their efficiency ratings. However, in the third year of the study, none of the differences on any of the teacher characteristics was significant.

The analysis of covariance results for almost all of the criterion measures indicated that differences in achievement between treatments were no greater than differences within treatments. This was true even when intelligence and readiness factors were controlled statistically. This finding suggests that factors other than the materials or methods have influenced the final outcomes. Such factors as teacher effectiveness, classroom and school environments, organizational patterns within schools and school systems, and familial or social influences are apparently more affective than the particular method or materials in determining the results of reading instruction. It appears likely that one of the most influential of these factors is probably teacher effectiveness, although data for determining the relative influence of any or all of the various factors is lacking.

While teachers most likely play a vital role in the effectiveness of instruction, it is interesting to note that the correlations between pupil achievement and teacher characteristics measured in the present study were all quite low. The correlations ranged from +.02 to -.08 for second-grade teachers and from +.02 to -.12 for third-grade teachers. The small correlations indicate that characteristics such as teacher's age, years of teaching experience, and efficiency rating as measured in this investigation contribute very little to variations in achievement of classes within treatments or between treatments when such differences were present. The findings suggest the need for future research to concentrate on matters relating to individual teaching style to help explain why one teacher is apparently more effective than another using the same materials and approaches to reading instruction.

Teacher Familiarity with Approaches

It seems probable that the extent of familiarity with the assigned method was not equal for teachers in the two treatment groups. None of the teachers in the linguistic group had ever taught this approach before. All of the teachers in the basal reader group had previously used these materials for reading instruction. However, many of the basal reader teachers reported that they had not previously followed the teacher's manual closely nor had they used pupil workbooks with any degree of regularity. Some of the basal reader teachers reported that they had not systematically developed word recognition skills to the extent indicated in the teacher's manual. Therefore, adhering to the teacher's manual and developing reading skills systematically was a new procedure for these teachers.

The teachers using the linguistic materials had previously used basal readers for instruction. To some extent this may have hampered their effective use of linguistic materials. There had to be a certain degree of "unlearning" of methods of teaching word analysis skills as usually recommended for instruction with the basal reader systems. Procedures for developing mastery of the spelling-patterns in the linguistic approach did not employ the usual type of phonic approach. Some teachers using the linguistic approach indicated that they found it difficult to refrain from helping pupils to attack new words without suggesting the usual phonic clues.

Attempts were made by the project staff to prepare teachers to deal more effectively with the assigned reading method through two-day workshops before the school year began and through frequent visits by project supervisors throughout the period of the experiment. While the two supervisors attempted to consult with their respective teachers at least once every six or seven school days, this was not always possible. In addition, the consultations often had to be held while pupils were working at their seats which meant that the teacher could not devote her attention solely to the supervisor. Efforts to cover the teacher's class and to free her for a private consultation with the supervisor were often not successful because substitutes were not available to take the teacher's class. The project staff attempted to obtain from School District administrators permission to meet with all teachers in each treatment on school time during the experimental period, but arrangements for such meetings were not made. The extent to which the project staff's efforts to equalize the familiarity of teachers with their respective approaches was insufficient therefore,may have influenced the outcome of the investigation.

Controlling the Hawthorne Effect

Efforts were made to avoid the contamination of Hawthorne effects. Both methods were treated as experimental methods and attempts were made to avoid giving teachers of basal reader courses the idea that they were using a control method. All teachers in both methods were provided with entirely new sets of materials. The latest revised editions of basal readers and accompanying materials were used. Both approaches were treated equally in terms of the number of workshop sessions and classroom visits by project supervisors, consultants, and the project director.

Suitability of Standardized Reading Tests as Criterion Measures

The Stanford Achievement Test was used as the major criterion instrument during all three years of the investigation. It was the instrument agreed upon by the 27 project directors in the USOE studies in meetings at the Coordinating Center. There were several problems with the instrument; the effects of these are not yet entirely clear.

Most of the pupils at the low ability score level found the Stanford test quite difficult and frustrating. Teachers working with these children were especially concerned and felt that the tests were unfair estimates of their pupils' achievement. Some teachers felt that items designed to evaluate pupil ability to read continuous material (paragraph reading subtest) included concepts completely alien to the experience of their pupils. It is difficult to evaluate the extent to which these matters affected pupil performance on the test and effects of pupil frustration on future learning.

Another matter of concern to the teachers in the linguistic treatment was their belief that the Stanford test was biased in favor of pupils using basal readers. They contended that the vocabulary and selection of skills measured (for example, in the Word Study Skills subtest which evaluated phonic abilities) favored basal reader pupils. The vocabulary in the various subtests appeared to be similar to vocabulary commonly taught in basal readers.

When the question was raised as part of the first year study, the present investigators compared the vocabulary in the two reading systems with the vocabulary in the Stanford test. The results of the comparison revealed that sometimes pupils in one treatment and sometimes pupils in the other treatment had previously met in their reading materials fewer of the words found in the several subtests. The comparison also indicated that pupils at the low ability score level in both treatments were similarly penalized because a smaller number of the words comprising the test vocabulary had appeared in their readers. As pupils progressed to higher reader levels, the size and similarity of their total vocabularies increased. Thus, pupils in the high ability score level were familiar with a larger proportion of the vocabulary found in the subtests.

It was felt by the project staff, that by the end of the third year of the investigation the total vocabularies of the two treatment groups should be far more alike than at the beginning of the study.

The selection of appropriate vocabulary skills to be tested, and format for presenting items in standardized tests that are to be used for purposes of evaluating pupil achievement following instruction in different types of reading materials,deserve the careful attention of test constructors. Perhaps standardized tests are not the most appropriate measures of progress. Or, perhaps instruments can be devised which include vocabularies and formats common to several reading systems to reduce the possibilities of bias in favor of one approach over another. It may be that adequate comparison of pupils under different systems of reading instruction is not possible until pupils have completed material comparable to a second reader level in difficulty. Close attention to these problems should be paid by future researchers in reading.

Comparison of Class Mean and Individual Pupil Score Analyses

As discussed under Treatment of the Data in Chapter II, separate analyses of the data for three years of the study were made: one analysis used split-class means as the statistical unit and the second analysis used individual pupil scores as the statistical unit. The reasons for the two analyses were presented in the section of the report alluded to above. The major analyses of data for the two-year continuation study presented in this report were based upon split-class means.

The use of split-class means resulted in far fewer significant differences between treatments. This finding was true for both the analysis of variance and the analysis of covariance in almost all instances. However, it is important to note that the difference in results obtained from the two analyses did not affect the final conclusion, namely that neither approach was more effective than the other upon reading and spelling achievement.

For example, the analysis of covariance of the second-grade results on the five Stanford Achievement subtests related to reading, spelling and language skills, produced four out of five significant differences when individual pupil scores were used as the statistical unit. However, when split-class means were used as the statistical unit, only two of the five subtest differences were significant. A similar reduction occurred for the analyses in the first year. In the third year, only one of four Stanford subtests was significant in both analyses.

A Consideration of Future Research in Reading

This final section will be devoted to a brief consideration of the nature, direction, and methodology of future research in reading. This will not be a detailed blueprint, but a sketch of a few of the thoughts and insights that have emerged following the completion of a three-year research project.

These thoughts are prompted by an important statement by Dykstra (1967), following his analysis of the data from thirteen of the Second-Grade Continuation Studies.

> One of the most important implications of this study is that future research should center on teacher and learning situation characteristics rather than method and materials. The extensive range among classrooms within any method points out the importance of elements in the learning situation over and above the materials employed. Furthermore, the persistence of project differences in achievement even after project differences in pupil readiness were adjusted statistically indicates that characteristics other than those related to pupils are highly influential in reading success. The elements of the learning situation attributable to teachers, classrooms, schools, and school systems are obviously extremely important. Improvement of reading instruction is more likely to result from improved selection and training of teachers, from improved in-service training programs, and from improved school learning climates, rather than from changes in instructional materials (p. 163).

Harris (1968), Fry (1966) and Sheldon (1967) among others, have also reported a wide range among classes within the same method and greater differences within methods than between methods.

The project directors were not unaware of the need to consider the possible influence of factors other than methods and materials upon the investigation. As already noted, data pertaining to teacher characteristics were collected and analyzed. However, the data showed that there was little relationship between the teacher characteristics evaluated in this study (and in most of the other cooperative reading studies) and reading achievement of pupils.

This suggests an urgent need for isolating and identifying important teacher and learning situation characteristics associated with successful reading achievement. Once the characteristics are identified, attempts can be made to construct appropriate instruments for their measurement. Chall and Feldman (1966) have already reported some successful efforts in this direction.

The present project director has felt for some time that perhaps one of the weaknesses in the cooperative first- and second-grade studies comparing one method with another was that even if one method did prove to be more effective in producing greater reading achievement, we would still be unable to determine the element or elements within that method responsible for the increased achievement. In general, these studies were not concerned with testing the various assumptions underlying particular methods, but methods were compared as total entities. Some researchers believe that closer attention should be paid to examination of various elements involved in the process of learning to read before further studies comparing methods are undertaken.

Many of the ideas we have perpetuated about the teaching of reading have been derived intuitively or from "armchair research," much like the results of introspection into his own reading process reported by Huey (1908) in his *Psychology and Pedagogy of Reading*. This is not to disparage the early important pioneer contributions of researchers like Huey, but to urge that current investigators focus some of their attention on objective studies into the nature of the reading process itself.

A shift in the priorities and emphasis for reading research was proposed by Levin (1966) in a consideration of the fundamental question for researchers in reading:

> The prior [research] question is *What is the process of reading* rather than, *What is the optimal teaching procedure*? Definite answers to the second wait on the first. . . (p. 140).

The present writers believe, along with Dykstra and Levin, that before further studies comparing reading methods and materials are carried out, research energies should be concentrated on the nature of reading, "teacher and learning situation characteristics," and basic assumptions undergirding reading methods to be compared.

As part of the research strategies involved in such investigations, serious attention should be given to the possible use of certain research procedures that might prove valuable in the kinds of studies suggested.

In his consideration of why some scientific fields have made greater progress than others, Platt (1964) contends that an important factor is the extent to which some scientists employ a systematic research method which he calls "strong inference."

According to Platt:

> . . . Strong inference consists of applying the following steps to every problem . . . formally and explicitly and regularly:
>
> 1. Devising alternative hypotheses;
>
> 2. Devising a crucial experiment or several of them, with alternative possible outcomes, each of which will, as nearly as possible exclude one or more the hypotheses;
>
> 3. Carrying out the experiment so as to get a clean result;
>
> 4. Recycling the procedure, making subhypotheses or sequential hypotheses to refine the possibilities that remain, and so on(p.347).

Applying this procedure to assumptions inherent in the linguistic approach to beginning reading, one might devise an experiment to determine whether one type of spelling-pattern or another may be more readily learned by first-grade pupils. A series of alternative hypotheses might be suggested to account for various combinations which could be more readily acquired by children. One or more experiments could then be devised with alternative possible outcomes which would exclude or disprove one or more of the hypotheses. The crucial experiment would then lead to a decision as to which combinations should be eliminated and which should be subject to further experiment.

This procedure might also be applied to testing assumptions underlying the basal reader approach. One such assumption involves the use of carefully controlled vocabulary that is introduced gradually and repeated frequently. The amount of vocabulary control and repetition for pupils of varying learning capacities needs careful researching. Following the general outline suggested in the illustration above, hypotheses about vocabulary control could be proposed and tested.

Another research procedure that deserves attention and consideration for more widespread use was proposed by Levin (1966) and used in his research at Cornell in connection with Project Literacy.

> Data should come from a fine grained analysis of the learner with the curriculum. The time intervals in which we gather data should be as small as practicable: a minute to a day, but certainly no more gross than that. The data must include the conditions -- teacher behavior and materials -- and the learners' responses to them, and,in turn, the teachers' behavior because the stream of influence is certainly continuous. In the early stages of curriculum development we should be free enough from the tyranny of statistics to make the observations informal. Opportunities might be taken to tinker with the curriculum *in situ* (p. 143).

The observation and "tinkering with the curriculum" would be followed by more formal observations, further revisions, and large scale testing. Levin has already begun to apply this approach to curriculum construction to a first-grade classroom at Cornell.

> . . . The team consists of a first-grade teacher, a psychologist, and a linguist who are present through the whole school day. The endeavor is a search for hypotheses about the nature of reading as well as an opportunity to try out observation schemes and teaching ideas. Detailed records are kept of the teacher's actions, the curricular materials, and the children's behavior. As ideas occur to the team they are able to implement them immediately so that each day gives us the test of hypotheses. We systematically record each child's reading. . . . We are ascertaining through standardized interviews the home experiences *vis a vis* reading (p. 144).

From the results of such research may come insights leading to new hypotheses to be tested through laboratory experimentation, creating "an interplay between the classroom and the laboratory."

> . . . There are many basic findings which have implications for reading instruction. Likewise, the observation of classrooms is a fount of problems which can profitably be abstracted from the school and be investigated under the controlled conditions of the laboratory. Ideally, this is a self-generating cycle (Levin, p. 145).

Thus, by focusing on the fundamental question: "What is the process of reading?" one may search for answers through the interplay between basic and applied research.

Another procedure that has proved effective in reading research is used by Jenkinson (1957), in her investigation of the reading comprehension of high school students in connection with her study employing the cloze procedure as an evaluative instrument. Through intensive questioning, she helped individual students to analyze certain processes involved in their reading comprehension. Such a procedure might prove fruitful in research concerned with the nature of reading.

It seems apparent to the present investigators that further research along the lines of comparative method designs will continue to suffer from serious limitations in our present knowledge of the basic process involved in learning to read and from our limited understanding of the ways in which certain crucial relevant factors, such as individual teaching styles, influence the effectiveness of particular methods for learning to read. Research procedures such as the "strong inference" method, Levin's curriculum analysis procedures, and the introspective approach, should be considered for conducting laboratory and classroom research into the fundamental processes of learning to read and into the interactions of the learning process with varying characteristics of teachers, schools, school systems, and the like.

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APPENDIX A - GRADE 1

Tables A-1 through A-4 show analysis of covariance F values and adjusted means (based on split-class means as the statistical unit) for criterion measures administered to the total sample.

Table A-1

ANALYSIS OF COVARIANCE F RATIOS FOR STANFORD ACHIEVEMENT SUBTESTS, GRADE 1

(Split-Class Mean as Unit)

		Stanford Subtests				
Source of Variation	df	Word Meaning	Paragraph Meaning	Vocabulary	Spelling	Word Study
Treatment (T)	1,30	0.36	1.13	6.12**	2.93	1.98
Ability Score Level (A)	2,30	3.31	8.27**	12.90**	0.16	1.24
Sex (S)	1,30	0.21	4.18*	0.91	1.74	1.24
T x A	2,30	1.53	5.47**	3.27	1.75	2.17
T x S	1,30	0.01	0.00	0.30	0.51	0.02
A x S	2,30	0.30	1.89	1.68	0.42	0.02
T x A x S	2,30	0.25	1.07	0.29	0.94	0.10

*Significant at .05 level.

**Significant at .01 level.

Table A-2

ADJUSTED MEANS FOR STANFORD WORD READING SUBTEST, GRADE 1 (Split-Class Mean as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N (Split-Class Means)	Mean		Mean	N (Split-Class Means)	Mean	
	Boys	4	20.09		19.26	4		
High	Girls	4	20.12		18.77	4	19.56	←
	Cell Total	8	20.11	←NS→	19.02	8		
	Boys	4	15.73		16.08	4		
Average	Girls	4	15.89		17.35	4	16.26	NS
	Cell Total	8	15.81	←NS→	16.71	8		
	Boys	4	16.22		15.46	4		
Low	Girls	4	16.62		15.57	4	15.97	←
	Cell Total	8	16.42	←NS→	15.52	8		
Total	Boys	12	17.35		16.93	12	17.14	← NS
	Girls	12	17.54		17.23	12	17.39	←
Total Treatment		24	17.45	←NS→	17.08	24		

Significance levels corresponding to F's shown in Table A-1 are indicated by arrows for selected comparisons.

Table A-3

ADJUSTED MEANS FOR STANFORD PARAGRAPH MEANING SUBTEST, GRADE 1 (Split-Class Mean as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N (Split-Class Means)	 Basal Reader Approach Mean		 Linguistic Approach Mean	 Linguistic Approach N (Split-Class Means)	Total Mean	
	Boys	4	19.38		16.05	4		
High	Girls	4	21.49		18.07	4	18.75 ←	┐
	Cell Total	8	20.43	← .05 →	17.06	8		│
	Boys	4	14.03		12.43	4		│
Average	Girls	4	15.28		16.06	4	14.45	.01
	Cell Total	8	14.65	← NS →	14.24	8		│
	Boys	4	14.87		17.40	4		│
Low	Girls	4	15.55		15.87	4	15.92 ←	┘
	Cell Total	8	15.21	← NS →	16.63	8		
Total	Boys	12	16.09		15.29	12	15.69 ←	┐ .05
	Girls	12	17.44		16.66	12	17.05 ←	┘
Total Treatment		24	16.77	← NS →	15.98	24		

Significance levels corresponding to *F*'s shown on Table A-1 are indicated by arrows for selected comparisons.

Table A-4

ADJUSTED MEANS FOR STANFORD
VOCABULARY SUBTEST, GRADE 1
(Split-Class Mean as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach			
Ability Score Level	Sex	N (Split-Class Means)	Mean		Mean	N (Split-Class Means)	Total Mean	
High	Boys	4	27.10		23.14	4	25.69	←
	Girls	4	27.91		24.63	4		
	Cell Total	8	27.50	←NS→	23.88	8		
Average	Boys	4	18.66		14.91	4		
	Girls	4	21.71		16.97	4	18.06	.01
	Cell Total	8	20.18	←.05→	15.94	8		
Low	Boys	4	13.13		14.95	4	13.44	←
	Girls	4	13.14		12.56	4		
	Cell Total	8	13.13	←NS→	13.76	8		
Total	Boys	12	19.63		17.67	12	18.65	← NS
	Girls	12	20.92		18.05	12	19.49	←
Total Treatment		24	20.27	←.05→	17.86	24		

Significance levels corresponding to F's shown in Table A-1 are indicated by arrows for selected comparisons.

Table A-5

ADJUSTED MEANS FOR STANFORD SPELLING SUBTEST, GRADE 1 (Split-Class Mean as Unit)

Ability Score Level	Sex	Basal Reader Approach N (Split-Class Means)	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N (Split-Class Means)	Total Mean
High	Boys	4	9.55		7.68	4	
	Girls	4	9.67		8.31	4	8.80 ←
	Cell Total	8	9.61	← NS →	8.00	8	
Average	Boys	4	8.27		8.53	4	
	Girls	4	9.80		10.25	4	9.21 NS
	Cell Total	8	9.03	← NS →	9.39	8	
Low	Boys	4	10.23		9.41	4	
	Girls	4	12.49		8.34	4	10.12 ←
	Cell Total	8	11.36	← NS →	8.87	8	
Total	Boys	12	9.35		8.54	12	8.95 ←
	Girls	12	10.66		8.97	12	9.81 ← NS
Total Treatment		24	10.00	← NS →	8.75	24	

Significance levels corresponding to F's in Table A-1 are indicated by arrows for selected comparisons.

Table A-6

ADJUSTED MEANS FOR STANFORD WORD STUDY SUBTEST, GRADE 1
(Split-Class Mean as Unit)

Ability Score Level	Sex	Treatments: Basal Reader Approach N (Split-Class Means)	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N (Split-Class Means)	Total Mean	
High	Boys	4	32.70		32.40	4		
	Girls	4	33.75		32.82	4	32.92 ←	
	Cell Total	8	33.23	←NS→	32.61	8		
Average	Boys	4	31.91		31.84	4		
	Girls	4	32.61		33.34	4	32.43	NS
	Cell Total	8	32.26	←NS→	32.59	8		
Low	Boys	4	35.64		32.32	4		
	Girls	4	37.11		32.93	4	34.50 ←	
	Cell Total	8	36.37	←NS→	32.63	8		
Total	Boys	12	33.42		32.19	12	32.80 ←	NS
	Girls	12	34.49		33.03	12	33.76 ←	
Total Treatment		24	33.95	←NS→	32.61	24		

Significance levels corresponding to F's shown in Table A-1 are indicated by arrows for selected comparisons.

APPENDIX B - GRADE 2

Tables B-1 and B-2 show analysis of variance F values, raw-score means, and standard deviations (based on split-class means as the statistical unit) for criterion measures administered to the total sample

Table B-1

ANALYSIS OF VARIANCE F RATIOS FOR STANFORD ACHIEVEMENT TEST, GRADE 2
(Split-Class Means as Unit)

Source of Variation	df	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Language	Science & Social Studies	Arithmetic Computations	Arithmetic Concepts
		F Ratios for Stanford Subtests							
Treatment (T)	1,32	7.84**	6.79*	5.01*	23.90**	2.64	6.23*	5.88*	18.25**
Ability Score Level (A)	2,32	337.09**	351.68**	220.08**	152.31**	634.53**	102.89**	90.24**	245.60**
Sex (S)	1,32	1.79	3.79	3.18	.51	4.40*	5.78*	2.55	5.13*
T x A	2,32	3.31*	5.05*	1.50	12.69**	7.75**	0.99	3.92*	10.00**
T x S	1,32	1.00	0.11	0.03	.03	.88	0.23	.66	.28
A x S	2,32	.22	0.04	0.08	.18	.65	4.79*	.27	.42
T x A x S	2,32	1.07	0.92	0.98	0.27	1.55	0.20	.46	.50

*Significant at .05 level.

**Significant at .01 level.

Table B-2

RAW-SCORE MEANS AND STANDARD DEVIATIONS STANFORD ACHIEVEMENT SUBTESTS, GRADE 2

(Split-Class Mean as Unit)

Group	Word Meaning	Paragraph Meaning	Spelling	Word Study	Language	Science & Social Studies	Arithmetic Computations	Arithmetic Concepts
					Means			
High Basal Boys	24.54	42.69	21.42	50.43	48.77	25.32	34.61	29.89
High Ling. Boys	24.62	41.94	20.63	39.00	48.64	23.06	28.98	27.51
High Basal Girls	27.00	45.60	24.17	53.24	50.94	22.90	39.30	28.77
High Ling. Girls	24.39	42.11	20.63	39.45	50.10	20.04	28.28	24.18
Ave. Basal Boys	13.79	24.81	10.69	30.91	35.21	16.24	19.77	18.35
Ave. Ling. Boys	11.10	16.54	6.88	27.13	29.49	15.88	18.80	12.57
Ave. Basal Girls	15.19	25.18	10.40	31.67	34.24	14.46	20.32	17.36
Ave. Ling. Girls	11.24	20.16	8.64	27.78	32.32	12.56	20.20	11.00
Low Basal Boys	9.72	12.32	3.39	22.47	26.51	13.06	8.88	11.20
Low Ling. Boys	9.29	12.40	3.36	22.61	27.92	12.25	9.46	11.95
Low Basal Girls	9.53	13.38	4.78	21.73	26.70	14.15	13.07	10.00
Low Ling. Girls	10.14	15.49	5.18	23.54	28.41	13.74	12.03	11.71
Total Treatment								
Basal	16.82	27.54	12.65	35.42	37.27	17.90	22.90	19.39
Linguistic	15.62	25.76	11.49	30.54	36.87	16.55	20.43	16.90
					Standard Deviations[a]			
High Basal Boys	2.41	4.02	1.02	5.86	2.07	1.62	10.4	5.64
High Ling. Boys	2.46	2.67	2.06	3.27	1.99	2.20	1.77	1.63
High Basal Girls	0.75	0.66	2.13	2.12	0.96	1.79	4.32	2.04
High Ling. Girls	0.65	2.09	1.87	3.12	1.43	1.51	0.39	1.32
Ave. Basal Boys	2.01	3.19	3.66	6.06	2.57	2.22	6.03	1.58
Ave. Ling. Boys	1.90	1.44	1.80	3.60	0.92	1.37	3.98	0.53
Ave. Basal Girls	2.28	4.20	4.18	5.55	3.08	3.26	6.07	2.49
Ave. Ling. Girls	2.21	3.00	2.86	2.86	1.26	2.36	2.23	0.86

Table B-2 (Continued)

Group	Word Meaning	Paragraph Meaning	Spelling	Word Study	Language	Science & Social Studies	Arithmetic Computations	Arithmetic Concepts
Low Basal Boys	0.78	5.43	2.53	2.66	1.22	1.19	3.15	1.60
Low Ling. Boys	1.79	2.15	2.48	2.09	1.87	1.82	1.16	1.90
Low Basal Girls	1.43	3.95	2.03	3.49	2.57	2.23	1.87	0.98
Low Ling. Girls	0.68	2.33	0.92	1.63	0.43	1.83	2.14	0.58
Total Treatments[a]								
Basal								
Linguistic								

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[a] Standard Deviations for total treatments were not available.

APPENDIX C - GRADE 2

Tables C-1 through C-4 show analysis of variance *F* values, raw-score means, and standard deviations (based on *individual pupil scores* as the statistical unit) for criterion measures administered to *subsamples* from each treatment group.

Table C-1

ANALYSIS OF VARIANCE F RATIOS FOR WRITING SAMPLE, GRADE 2

		F Ratios for Writing Sample Subtests				
Source of Variation	df	Running Words	Different Words	Spelling	Polysyllabic Words	Mechanics-Ratio
Treatment (T)	1,78	.09	.49	.00	.91	.02
Ability Score Level (A)	2,78	25.38**	48.21**	35.11**	32.50**	22.32**
Sex (S)	1,78	4.62*	7.05**	7.15**	10.28**	3.69
T x A	2,78	0.42	0.19	0.32	0.07	2.21
T x S	1,78	5.24*	3.86	3.97*	1.26	0.00
A x S	2,78	2.53	2.55	2.42	2.40	0.11
T x A x S	2,78	1.69	1.37	2.05	0.72	0.12

*Significant at .05 level.

**Significant at .01 level.

Table C-2

RAW-SCORE MEANS AND STANDARD DEVIATIONS WRITING SAMPLE FOR GRADE 2 (Individual Pupil Score as Unit)

Group	Running Words	Different Words	Spelling	Polysyllabic Words	Mechanics Ratio
			Means		
High Basal Boys	57.83	41.33	52.67	15.33	79.17
High Ling. Boys	58.25	39.50	53.00	13.50	79.25
High Basal Girls	74.22	48.22	69.22	20.11	83.67
High Ling. Girls	92.36	54.27	81.00	25.18	79.09
Ave. Basal Boys	64.44	30.11	51.22	9.78	39.44
Ave. Ling. Boys	35.86	22.57	26.71	8.00	48.43
Ave. Basal Girls	35.00	22.00	30.00	8.67	40.83
Ave. Ling. Girls	59.00	37.00	49.12	12.50	55.88
Low Basal Boys	27.00	18.00	19.00	3.00	56.71
Low Ling. Boys	22.75	16.25	17.50	4.88	45.00
Low Basal Girls	25.12	13.12	19.62	3.88	56.12
Low Ling. Girls	23.14	13.00	15.57	3.86	47.14
Total Treatment					
Basal	48.78	29.24	41.56	10.33	59.42
Linguistic	51.47	31.84	42.93	12.29	59.18
			Standard Deviations[a]		
High Basal Boys	25.92	16.99	26.18	7.85	12.07
High Ling. Boys	12.85	7.63	13.47	5.59	12.01
High Basal Girls	28.51	14.27	24.12	7.80	7.97
High Ling. Girls	25.32	11.96	25.54	8.47	11.49
Ave. Basal Boys	53.18	18.52	39.22	10.48	20.49
Ave. Ling. Boys	16.84	8.46	15.40	5.95	22.31
Ave. Basal Girls	24.72	13.32	19.40	9.64	24.05
Ave. Ling. Girls	21.56	12.19	17.04	8.54	11.98
Low Basal Boys	11.17	7.65	8.40	2.62	26.98
Low Ling. Boys	8.93	5.74	6.91	2.85	24.18
Low Basal Girls	9.83	6.41	7.07	2.80	21.72
Low Ling. Girls	9.98	5.40	8.80	1.46	25.91
Total Treatments					
Basal					
Linguistic					

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[a] Standard deviations for total treatments were not available.

Table C-3

ANALYSIS OF VARIANCE F RATIOS FOR ORAL READING TESTS AT END OF GRADE 2

(Individual Pupil Score as Unit)

		F Ratios			
Source of Variation	df	Gilmore Accuracy	Gilmore Rate	Gates	Fry
Treatment (T)	1,78	12.60**	2.58	3.69	1.22
Ability Score Level (A)	2,78	70.74**	1.56	91.52**	99.42**
Sex (S)	1,78	10.79**	.06	16.95**	14.37**
T x A	2,78	5.54**	.84	2.04	2.05
T x S	1,78	.59	.48	2.00	1.70
A x S	2,78	3.81*	1.36	4.56*	3.94*
T x A x S	2,78	.66	1.29	1.97	1.60

*Significant at .05 level.

**Significant at .01 level.

Table C-4

RAW-SCORE MEANS AND STANDARD DEVIATIONS ORAL READING TESTS, GRADE 2 (Individual Pupil Score as Unit)

Group	Gilmore Accuracy	Gilmore Rate	Gates	Fry
		Means		
High Basal Boys	63.00	96.17	35.50	41.83
High Ling. Boys	40.25	119.25	29.50	33.25
High Basal Girls	60.00	97.11	35.78	42.67
High Ling. Girls	45.09	121.36	31.36	37.82
Ave. Basal Boys	30.33	73.67	18.22	15.78
Ave. Ling. Boys	15.43	63.57	8.43	5.71
Ave. Basal Girls	38.33	87.50	21.17	18.33
Ave. Ling. Girls	35.12	100.38	23.62	23.75
Low Basal Boys	16.57	48.86	9.71	6.29
Low Ling. Boys	18.50	139.50	10.88	9.25
Low Basal Girls	16.62	62.62	9.25	4.00
Low Ling. Girls	17.14	65.57	10.00	6.00
Total Treatment				
Basal	37.11	77.48	21.51	21.40
Linguistic	29.20	103.00	19.29	19.89
		Standard Deviations[a]		
High Basal Boys	11.78	15.08	3.59	3.44
High Ling. Boys	9.01	13.20	6.02	8.84
High Basal Girls	11.06	16.62	2.62	1.49
High Ling. Girls	9.17	22.15	3.47	5.97
Ave. Basal Boys	12.62	21.51	9.00	14.72
Ave. Ling. Boys	7.48	19.02	3.42	4.30
Ave. Basal Girls	15.77	22.45	8.82	13.88
Ave. Ling. Girls	7.99	17.54	7.52	10.18
Low Basal Boys	13.12	28.03	8.17	11.04
Low Ling. Boys	8.09	207.29	5.56	6.42
Low Basal Girls	9.67	31.20	5.93	6.00
Low Ling. Girls	8.22	18.96	5.40	3.46
Total Treatment[a]				
Basal				
Linguistic				

[a] Standard deviations for total treatments are not available.

APPENDIX D - GRADE 2

Tables D-1 through D-11 show analysis of variance F values, raw-score means and standard deviations, analysis of covariance F values, and adjusted means (based on individual pupil scores as the statistical unit) for criterion tests administered to the total sample

Table D-1

ANALYSIS OF VARIANCE FOR STANFORD ACHIEVEMENT TEST, GRADE 2

(Individual Pupil Score as Unit)

Source of Variation	df	Word Meaning	Paragraph Meaning	Science & Social Studies	Spelling	Word Study	Language	Arithmetic Computations	Arithmetic Concepts
Treatment (T)	1,472	12.48**	20.81**	17.38**	14.82**	73.74**	3.39	37.14**	45.89**
Ability Score Level (A)	2,472	404.58**	591.24**	237.13**	416.81**	324.88**	381.70**	342.93**	392.75**
Sex (S)	1,472	12.16**	24.36**	8.32**	20.30**	11.63**	14.49**	14.83**	1.20
T x A	2,472	3.40	6.37**	3.89**	2.05	31.20**	3.94*	21.12**	13.56**
T x S	1,472	.67	1.10	.99	.00	.16	1.64	1.50	.02
A x S	2,472	.17	.47	7.33**	.50	.72	.21	.81	2.18
T x A x S	2,472	.40	.98	.29	2.15	.20	1.10	.69	.18

*Significant at .05 level.

**Significant at .01 level.

Table D-2

RAW-SCORE MEANS AND STANDARD DEVIATIONS
STANFORD ACHIEVEMENT SUBTESTS, GRADE 2
(Individual Pupil Score as Unit)

Group	Word Meaning	Paragraph Meaning	Spelling	Word Study	Language	Science & Social Studies	Arithmetic Computations	Arithmetic Concepts
					Means			
High Basal Boys	25.54	44.29	21.71	52.14	49.03	25.83	37.77	32.09
High Ling. Boys	24.42	41.75	20.51	38.80	45.55	22.85	29.07	27.65
High Basal Girls	27.00	45.58	24.24	53.22	50.98	23.02	39.02	28.65
High Ling. Girls	24.37	41.98	20.50	39.39	50.15	20.00	28.26	24.13
Ave. Basal Boys	13.59	24.87	10.77	30.54	35.41	16.25	19.62	18.21
Ave. Ling. Boys	11.19	16.47	7.08	27.02	29.47	16.00	18.64	12.45
Ave. Basal Girls	15.06	24.84	10.00	31.06	33.84	14.16	19.75	17.38
Ave. Ling. Girls	11.34	20.32	8.74	27.63	32.37	12.47	20.26	11.03
Low Basal Boys	9.71	12.24	3.44	22.50	26.59	13.00	8.97	11.24
Low Ling. Boys	9.70	11.85	2.85	22.15	27.44	12.70	9.41	11.70
Low Basal Girls	9.56	14.11	5.11	21.78	26.85	14.04	13.19	10.11
Low Ling. Girls	10.14	15.31	5.29	23.37	28.43	13.34	11.63	11.63
Total Treatment								
Basal	17.92	29.82	13.91	37.34	38.80	18.37	24.89	20.81
Linguistics	16.41	26.96	12.23	31.14	37.81	17.06	21.16	17.66
					Standard Deviations[a]			
High Basal Boys	4.87	7.58	4.89	7.25	8.17	4.14	10.64	6.20
High Ling. Boys	5.17	6.80	6.12	9.80	7.63	4.84	6.50	6.95
High Basal Girls	4.33	6.15	5.08	7.81	6.09	4.70	8.17	5.92
High Ling. Girls	5.32	7.34	5.51	9.89	7.59	5.33	4.38	6.75
Ave. Basal Boys	6.89	10.05	7.67	12.23	8.54	4.07	9.46	6.93
Ave. Ling. Boys	6.81	10.65	6.31	5.57	7.79	4.37	7.34	5.20
Ave. Basal Girls	6.70	9.66	6.57	10.20	10.16	3.96	9.21	6.75
Ave. Ling. Girls	5.21	9.25	5.34	7.17	8.39	3.42	7.09	4.37

Table D-2 (Continued)

Group	Word Meaning	Paragraph Meaning	Spelling	Word Study	Language	Science & Social Studies	Arithmetic Computations	Arithmetic Concepts
Low Basal Boys	4.28	7.71	4.49	6.32	5.80	3.57	8.12	4.25
Low Ling. Boys	3.59	5.64	3.21	5.77	6.15	3.49	6.14	3.15
Low Basal Girls	4.22	6.78	4.86	5.79	8.33	3.41	6.77	3.92
Low Ling. Girls	3.13	7.23	4.92	6.03	6.44	3.60	6.08	4.26
Total Treatment[a]								
Basal								
Linguistic								

[a] Standard deviations for total treatments were not available.

Table D-3

ANALYSIS OF COVARIANCE F RATIOS FOR STANFORD SUBTESTS, GRADE 2

(Individual Pupil Score as Unit)

Source of Variation	df	Word Meaning	Paragraph Meaning	Science & Social Studies	Spelling	Word Study	Language	Arithmetic Computations	Arithmetic Concepts
Treatment (T)	1,466	2.24	8.61**	6.90**	10.29**	40.85**	0.01	20.47**	18.23**
Ability (A)	2,466	53.08**	67.49**	27.20**	43.64**	18.71**	42.06**	17.73**	43.02**
Sex (S)	1,466	3.02	11.04**	22.84**	10.12**	2.54	6.44*	7.78**	7.80**
T x A	2,466	2.10	4.67**	3.10*	0.85	32.85**	2.51	22.51**	8.41**
T x S	1,466	0.61	2.62	0.57	0.06	0.02	2.46	0.99	0.28
A x S	2,466	0.40	1.43	7.25**	0.56	0.84	0.15	0.46	1.87
T x A x S	2,466	0.71	1.99	0.01	2.88	0.53	1.58	1.66	0.27

*Significant at .05 level.

**Significant at .01 level.

Table D-4

ADJUSTED MEANS FOR STANFORD WORD MEANING SUBTEST , GRADE 2

(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N	 Mean		 Linguistic Approach Mean	 N	Total Mean	
High	Boys	35	20.22		20.66	55		
	Girls	55	21.14		19.89	54	20.50 ←	
	Cell Total	90	20.78	← NS →	20.28	109		
Average	Boys	39	14.33		12.97	53		
	Girls	32	15.46		13.20	38	13.84	.01
	Cell Total	71	14.84	← NS →	13.07	91		
Low	Boys	34	16.00		16.05	27		
	Girls	27	15.28		16.17	35	15.90 ←	
	Cell Total	61	15.68	← NS →	16.12	62		
Total	Boys	108	16.76		16.72	135	16.74 ←	NS
	Girls	114	18.16		16.86	127	17.48 ←	
Total Treatment		222	17.48	← NS →	16.79	262		

Significance levels corresponding to F's in Table D-3 are indicated by arrows for selected comparisons.

Table D-5

ADJUSTED MEANS FOR STANFORD PARAGRAPH MEANING SUBTEST, GRADE 2
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N	 Mean		 Linguistic Approach Mean	 N	 Total Mean	
	Boys	35	35.51		35.01	55		
High	Girls	55	35.79		34.28	54	35.11 ←	┐
	Cell Total	90	35.68	← NS →	34.64	109		│
	Boys	39	26.06		19.32	53		│
Average	Girls	32	25.31		23.33	38	23.07	.01
	Cell Total	71	25.72	← .01 →	21.00	91		│
	Boys	34	23.47		22.72	27		│
Low	Girls	27	24.28		25.49	35	24.06 ←	┘
	Cell Total	61	23.83	← NS →	24.28	62		
Total	Boys	108	28.30		26.39	135	27.24 ←	┐ .01
	Girls	114	30.12		28.58	127	29.31 ←	┘
Total Treatment		222	29.24	← .01 →	27.45	262		

Significance levels corresponding to F's shown in Table D-3 are indicated by arrows for selected comparisons.

Table D-6

ADJUSTED MEANS FOR STANFORD SPELLING SUBTEST,
GRADE 2
(Individual Pupil Score as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
	Boys	35	16.65		16.11	55		
High	Girls	55	18.11		15.43	54	16.57 ←	
	Cell Total	90	17.54	← .01 →	15.77	109		
	Boys	39	11.47		8.62	53		
Average	Girls	32	10.71		10.32	38	10.12	.01
	Cell Total	71	11.13	← .05 →	9.33	91		
	Boys	34	10.67		9.70	27		
Low	Girls	27	11.79		11.78	35	11.02 ←	
	Cell Total	61	11.16	← NS →	10.87	62		
Total	Boys	108	12.90		11.89	135	12.34 ←	.01
	Girls	114	14.53		12.90	127	13.67 ←	
Total Treatment		222	13.74	← .01 →	12.38	262		

Significance levels corresponding to _F_'s shown in Table D-3 are indicated by arrows for selected comparisons.

Table D-7

ADJUSTED MEANS FOR STANFORD WORD STUDY SUBTEST, GRADE 2
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N	 Mean		 Linguistic Approach Mean	 N	 Total Mean	
High	Boys	35	42.98		32.66	55	37.47	←
	Girls	55	43.67		32.48	54		
	Cell Total	90	43.40	← .01 →	32.57	109		
Average	Boys	39	31.73		30.26	53		
	Girls	32	31.05		31.20	38	30.99	.01
	Cell Total	71	31.42	← NS →	30.65	91		
Low	Boys	34	32.76		32.42	27		
	Girls	27	30.97		32.77	35	32.30	←
	Cell Total	61	31.97	← NS →	32.62	62		
Total	Boys	108	35.70		31.67	135	33.46	← NS
	Girls	114	37.12		32.18	127	34.51	←
Total Treatment		222	36.43	← .01 →	31.92	262		

Significance levels corresponding to F's shown in Table D-3 are indicated by arrows for selected comparisons.

Table D-8

ADJUSTED MEANS FOR STANFORD LANGUAGE SUBTEST, GRADE 2
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total Mean	
			Treatments					
High	Boys	35	42.60		43.93	55		
	Girls	55	44.10		45.07	54	44.05 ←	
	Cell Total	90	43.52	← NS →	44.50	109		
Average	Boys	39	36.07		31.75	53		
	Girls	32	34.12		34.76	38	33.97	.01
	Cell Total	71	35.19	← .05 →	33.01	91		
Low	Boys	34	34.07		34.84	27		
	Girls	27	33.72		35.44	35	34.55 ←	
	Cell Total	61	33.92	← NS →	35.18	62		
Total	Boys	108	37.56		37.33	135	37.43 ←	.01
	Girls	114	38.84		39.33	127	39.10 ←	
Total Treatment		222	38.22	← NS →	38.30	262		

Significance levels corresponding to F 's shown in Table D-3 are indicated by arrows for selected comparisons.

Table D-9

ADJUSTED MEANS FOR STANFORD SCIENCE AND SOCIAL STUDIES SUBTEST, GRADE 2
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
		N	Mean		Mean	N	Mean	
High	Boys	35	22.04		20.19	55		
	Girls	55	19.28		16.92	54	19.38 ←	
	Cell Total	90	20.35	←.01→	18.57	109		
Average	Boys	39	17.14		17.01	53		
	Girls	32	14.32		13.89	38	15.78	.01
	Cell Total	71	15.87	← NS →	15.70	91		
Low	Boys	34	17.28		17.17	27		
	Girls	27	17.70		17.33	35	17.36 ←	
	Cell Total	61	17.46	← NS →	17.26	62		
Total	Boys	108	18.77		18.34	135	18.53 ←	.01
	Girls	114	17.51		16.13	127	16.78 ←	
Total Treatments		222	18.12	←.01→	17.27	262		

Significance levels corresponding to F's shown in Table D-3 are indicated by arrows for selected comparisons.

Table D-10

ADJUSTED MEANS FOR STANFORD ARITHMETIC COMPUTATION SUBTEST, GRADE 2
(Individual Pupil Score as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
High	Boys	35	31.28		24.12	55		
	Girls	55	32.75		23.20	54	27.52	←
	Cell Total	90	32.18	←.01→	23.67	109		
Average	Boys	39	20.64		20.54	53		
	Girls	32	19.84		22.72	38	20.94	.01
	Cell Total	71	20.28	←NS→	21.45	91		
Low	Boys	34	16.53		16.90	27		
	Girls	27	19.84		18.52	35	17.90	←
	Cell Total	61	18.00	←NS→	17.81	62		
Total	Boys	108	22.79		21.27	135	21.95	← .01
	Girls	114	26.07		21.77	127	23.80	←
Total Treatment		222	24.48	←.01→	21.51	262		

Significance levels corresponding To F's shown in Table D-3 are indicated by arrows for selected comparison.

Table D-11

ADJUSTED MEANS FOR STANFORD ARITHMETIC
CONCEPTS SUBTESTS, GRADE 2
(Individual Pupil Score as Unit)

		Treatments						
		Basal Reader Approach			Linguistic Approach		Total	
Ability Score Level	Sex	N	Mean		Mean	N	Mean	
High	Boys	35	25.72		23.24	55		
	Girls	55	22.63		19.74	54	22.56 ←	
	Cell Total	90	22.83	←.01→	21.50	109		
Average	Boys	39	18.93		14.63	53		
	Girls	32	17.23		13.62	38	15.94	.01
	Cell Total	71	18.17	←.01→	14.21	91		
Low	Boys	34	18.02		18.49	27		
	Girls	27	16.16		17.90	35	17.68 ←	
	Cell Total	61	17.20	←NS→	18.16	62		
Total	Boys	108	20.84		18.91	135	19.77 ←	.01
	Girls	114	19.58		17.40	127	18.43 ←	
Total Treatment		222	20.20	←.01→	18.18	262		

Significance levels corresponding to F's shown in Table D-3 are indicated by arrows for selected comparisons.

APPENDIX E - GRADE 3

Tables E-1 and E-2 show analysis of variance _F_ values, and raw-score means and standard deviations (based on _split-class means_ as the statistical unit) for criterion measures administered to the _total sample_.

Table E-1

ANALYSIS OF VARIANCE F RATIOS FOR COMBINED STANFORD ACHIEVEMENT SUBTESTS, GRADE 3

(Split-Class Mean as Unit)

Source of Variation	df	Combined Stanford Subtests			
		Word Meaning	Paragraph Meaning	Spelling	Word Study Skills
Treatment (T)	1,32	1.31	0.02	0.33	8.38**
Ability Score Level (A)	2,32	177.30**	232.71**	117.15**	182.39**
Sex (S)	1,32	0.01	0.25	5.83*	0.79
T x A	2,32	2.11	3.40*	1.97	3.19
T x S	1,32	0.08	0.19	0.02	0.01
A x S	2,32	0.63	0.02	0.06	0.15
T x A x S	2,32	0.68	0.42	0.85	0.42

*Significant at .05 level.

**Significant at .01 level.

Table E-2

RAW SCORE MEANS AND STANDARD DEVIATIONS FOR COMBINED STANFORD ACHIEVEMENT SUBTESTS , GRADE 3
(Split-Class Mean as Unit)

Group	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills
		Means		
High Basal Boys	57.76	91.91	60.91	102.58
High Basal Girls	56.66	92.84	65.76	104.52
High Ling. Boys	53.54	88.90	58.02	89.00
High Ling. Girls	51.29	87.61	60.86	92.18
Ave. Basal Boys	35.25	57.29	35.07	66.86
Ave. Basal Girls	32.62	56.66	35.41	66.07
Ave. Ling. Boys	28.42	48.20	28.80	51.67
Ave. Ling. Girls	29.40	51.89	36.23	55.14
Low Basal Boys	19.54	32.32	19.11	42.93
Low Basal Girls	24.21	36.89	24.79	47.68
Low Ling. Boys	20.56	36.48	22.20	43.92
Low Ling. Girls	23.53	40.30	30.83	43.77
Total Treatments				
Basal	41.06	66.99	44.45	77.58
Linguistic	37.39	63.65	42.56	67.00
		Standard Deviations[a]		
High Basal Boys	8.93	15.4	13.0	13.0
High Basal Girls	7.05	10.3	9.68	13.0
High Ling. Boys	9.55	14.1	14.2	20.7
High Ling. Girls	8.38	14.5	11.9	18.0
Ave. Basal Boys	15.0	22.0	16.4	26.4
Ave. Basal Girls	12.0	19.7	16.1	19.9
Ave. Ling. Boys	13.2	19.5	14.6	14.1
Ave. Ling. Girls	9.67	15.9	10.7	15.8
Low Basal Boys	7.61	11.0	11.7	13.8
Low Basal Girls	8.87	12.6	14.2	16.5
Low Ling. Boys	12.3	16.4	11.5	9.27
Low Ling. Girls	6.62	12.4	11.8	7.65
Total Treatments[a]				
Basal				
Linguistic				

[a] Standard deviations for total treatments were not available.

APPENDIX F - GRADE 3

Tables F-1 through F-5 show analysis of variance F values, and raw-score means and standard deviations (based on individual pupil scores) for criterion measures administered to subsamples from each treatment group.

Table F-1

ANALYSIS OF VARIANCE F RATIOS FOR ORAL READING TESTS, GRADE 3

(Individual Pupil Score as Unit)

Source of Variation	df	Gilmore Accuracy	Gilmore Rate	Gates
Treatment (T)	1,77	3.69	2.97	0.02
Ability Score Level (A)	2,77	54.30**	11.12**	51.17**
Sex (S)	1,77	11.17**	5.26*	8.24**
T x A	2,77	4.13*	1.24	1.79
T x S	1,77	0.04	0.35	0.02
A x S	2,77	1.11	0.42	0.90
T x A x S	2,77	0.12	0.10	0.03

*Significant at .05 level.

**Significant at .01 level.

Table F-2

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR GILMORE ORAL READING TEST, GRADE 3

(Individual Pupil Score as Unit)

Group	Gilmore Accuracy	Gilmore Rate
	Means	
High Basal Boys	73.25	107.75
High Basal Girls	70.00	118.60
High Linguistic Boys	57.40	112.60
High Linguistic Girls	60.30	131.30
Average Basal Boys	43.89	103.67
Average Basal Girls	55.33	106.33
Average Linguistic Boys	31.86	102.14
Average Linguistic Girls	42.25	105.50
Low Basal Boys	23.62	74.25
Low Basal Girls	24.14	76.29
Low Linguistic Boys	28.38	88.62
Low Linguistic Girls	30.29	103.86
Total Treatments		
Basal	47.23	98.09
Linguistic	42.00	108.24
	Standard Deviations[a]	
High Basal Boys	13.3	8.77
High Basal Girls	11.8	19.1
High Linguistic Boys	12.6	18.4
High Linguistic Girls	10.1	20.4
Average Basal Boys	16.1	31.1
Average Basal Girls	22.6	14.6
Average Linguistic Boys	5.49	19.2
Average Linguistic Girls	14.9	16.2
Low Basal Boys	17.2	30.3
Low Basal Girls	10.4	28.8
Low Linguistic Boys	12.1	29.0
Low Linguistic Girls	11.8	51.5
Total Treatments[a]		
Basal		
Linguistic		

---

[a] Standard deviations for total treatments were not available.

Table F-3

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR GATES WORD PRONUNCIATION TEST, GRADE 3
(Individual Pupil Score as Unit)

Group	Means	Standard Deviations[a]
High Basal Boys	37.25	2.63
High Basal Girls	38.20	1.99
High Linguistic Boys	35.60	4.39
High Linguistic Girls	37.30	2.41
Average Basal Boys	25.89	11.2
Average Basal Girls	31.00	7.32
Average Linguistic Boys	22.43	4.76
Average Linguistic Girls	26.75	9.74
Low Basal Boys	15.75	11.9
Low Basal Girls	14.29	8.12
Low Linguistic Boys	18.75	7.76
Low Linguistic Girls	18.29	7.02
Total Treatments[a]		
Basal	26.73	
Linguistic	26.67	

[a] Standard deviations for total treatments were not available.

Table F-4

ANALYSIS OF VARIANCE F RATIOS FOR WRITING SAMPLE, GRADE 3
(Individual Pupil Score as Unit)

Source of Variation	df	Running Words	Different Words	Spelling	Polysyllabic Words	Mechanics-Ratio
Treatment (T)	1,77	6.03*	0.81	4.35*	1.52	0.20
Ability Score Level (A)	2,77	15.09**	25.53**	22.16**	22.86**	14.53**
Sex (S)	1,77	33.14**	36.73**	41.36**	37.43**	7.03**
T x A	2,77	4.98**	5.19**	4.03*	1.37	1.67
T x S	1,77	0.78	0.21	1.57	0.02	0.90
A x S	2,77	2.91	4.21*	3.20*	3.09	1.61
T x A x S	2,77	0.02	0.01	0.11	0.86	0.78

*Significant at .05 level.

**Significant at .01 level.

Table F-5

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR WRITING SAMPLE, GRADE 3
(Individual Pupil Score as Unit)

Group	Running Words	Different Words	Spelling	Polysyllabic Words	Mechanics-Ratio
			Means		
High Basal Boys	84.50	46.25	82.50	12.25	78.00
High Basal Girls	135.50	79.20	129.90	29.80	84.20
High Ling. Boys	121.20	62.40	109.60	20.80	75.40
High Ling. Girls	185.00	89.50	176.10	31.30	82.00
Ave. Basal Boys	72.44	39.56	60.00	9.67	49.78
Ave. Basal Girls	139.00	73.67	126.50	19.33	54.67
Ave. Ling. Boys	46.86	27.00	36.29	5.71	71.00
Ave. Ling. Girls	121.88	54.50	111.00	19.12	57.38
Low Basal Boys	45.25	24.75	37.62	6.38	51.12
Low Basal Girls	48.86	29.29	37.29	6.71	63.14
Low Ling. Boys	79.88	40.00	55.25	9.38	44.62
Low Ling. Girls	100.71	40.57	83.71	14.00	61.43
Total Treatments					
Basal	88.25	49.50	79.32	14.73	63.20
Linguistic	113.40	54.13	99.53	17.40	65.33
			Standard Deviations[a]		
High Basal Boys	35.2	17.3	34.9	6.02	16.2
High Basal Girls	19.9	18.2	20.3	7.90	11.1
High Ling. Boys	50.00	14.9	46.5	14.1	8.32
High Ling. Girls	67.7	26.5	64.8	11.1	11.0
Ave. Basal Boys	35.3	14.6	27.2	4.97	19.5
Ave. Basal Girls	40.5	28.3	36.3	9.75	14.9
Ave. Ling. Boys	15.2	7.23	12.3	3.86	16.5
Ave. Ling. Girls	62.2	24.0	56.4	13.6	18.3
Low Basal Boys	49.3	20.7	49.4	8.26	19.8
Low Basal Girls	19.7	13.8	21.6	7.83	33.2
Low Ling. Boys	48.6	20.9	43.1	6.89	24.6
Low Ling. Girls	48.2	18.3	41.8	5.07	20.4
Total Treatments[a]					
Basal					
Linguistic					

[a] Standard deviations for total treatments were not available.

APPENDIX G - GRADE 3

Tables G-1 through G-7 show analysis of variance *F* values, raw score means and standard deviations, analysis of covariance *F* values, and adjusted means (based on *individual pupil scores* as the statistical unit) for criterion measures administered to the *total sample*.

Table G-1

ANALYSIS OF VARIANCE *F* RATIOS FOR COMBINED STANFORD ACHIEVEMENT SUBTESTS, GRADE 3

(Individual Pupil Score as Unit)

Source of Variation	df	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills
Treatment (T)	1,411	13.18**	4.28*	1.59	40.96**
Ability Score Level (A)	2,411	403.30**	445.46**	317.83**	381.69**
Sex (S)	1,411	4.30*	9.62**	32.45**	13.02**
T x A	2,411	2.50	3.61*	3.75*	4.74**
T x S	1,411	6.02*	6.83**	2.13	5.32*
A x S	2,411	2.87	0.96	0.90	0.06
T x A x S	2,411	0.68	0.44	1.18	0.55

*Significant at .05 level.

**Significant at .01 level.

Table G-2

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR COMBINED STANFORD ACHIEVED SUBTESTS, GRADE 3
(Individual Pupil Score as Unit)

Group	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills
		Means		
High Basal Boys	57.76	91.91	60.91	102.58
High Basal Girls	56.66	92.84	65.76	104.52
High Ling. Boys	53.54	88.90	58.02	89.00
High Ling. Girls	51.29	87.61	60.86	92.18
Ave. Basal Boys	35.25	57.29	35.07	66.86
Ave. Basal Girls	32.62	56.66	35.41	66.07
Ave. Ling. Boys	28.42	48.20	28.80	51.67
Ave. Ling. Girls	29.40	51.86	36.23	55.14
Low Basal Boys	19.54	32.32	19.11	42.93
Low Basal Girls	24.21	36.89	24.79	47.68
Low Ling. Boys	20.56	36.48	22.20	43.92
Low Ling. Girls	23.53	40.30	30.83	43.77
Total Treatment				
Basal	41.06	66.99	44.45	77.58
Linguistic	37.39	63.65	42.56	67.00
		Standard Deviations[a]		
High Basal Boys	8.93	15.4	13.0	13.0
High Basal Girls	7.05	10.3	9.68	13.0
High Ling. Boys	9.55	14.1	14.2	20.7
High Ling. Girls	8.38	14.5	11.9	18.0
Ave. Basal Boys	15.0	22.0	16.4	26.4
Ave. Basal Girls	12.0	19.7	16.1	19.9
Ave. Ling. Boys	13.2	19.5	14.6	14.1
Ave. Ling. Girls	9.67	15.9	10.7	15.8
Low Basal Boys	7.61	11.0	11.7	13.8
Low Basal Girls	8.87	12.6	14.2	16.5
Low Ling. Boys	12.3	16.4	11.5	9.27
Low Ling. Girls	6.62	12.4	11.8	7.65
Total Treatment[a]				
Basal				
Linguistic				

---

[a] Standard deviations for total treatments were not available.

Table G-3

ANALYSIS OF COVARIANCE *F* RATIOS FOR COMBINED STANFORD ACHIEVEMENT SUBTESTS, GRADE 3

(Individual Pupil Score as Unit)

Source of Variation		Combined Stanford Subtests			
	df	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills
Treatment (T)	1,406	1.69	0.16	0.94	18.66**
Ability Score Level (A)	2,406	23.39**	28.87**	26.43**	26.11**
Sex (S)	1,406	0.05	1.80	22.89**	4.37*
T x A	2,406	0.28	0.97	1.10	1.48
T x S	1,406	0.10	0.10	0.34	0.09
A x S	2,406	2.08	0.23	0.40	0.21
T x A x S	2,406	1.28	1.11	1.23	0.97

*Significant at .05 level.

**Significant at .01 level.

Table G-4

ADJUSTED MEANS FOR COMBINED STANFORD WORD MEANING SUBTEST,
GRADE 3
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments							
		Basal Reader Approach			Linguistic Approach		Total		
		N	Mean		Mean	N	N	Mean	
High	Boys	33	45.37		44.54	52			
	Girls	50	44.30		42.35	49	184	44.04	←
	Cell Total	83	44.73	←NS→	43.78	101			
Average	Boys	28	36.94		33.46	45			
	Girls	29	33.42		34.30	35	137	34.38	.01
	Cell Total	57	35.15	←NS→	33.83	80			
Low	Boys	28	34.81		35.41	25			
	Girls	19	37.84		37.06	30	102	36.18	←
	Cell Total	47	36.03	←NS→	36.31	55			
Total	Boys	89	39.40		38.58	122	211	38.93	← NS
	Girls	98	39.83		38.49	114	212	39.11	←
Total Treatment		187	39.62	←NS→	38.54	236			

Significance levels corresponding to F's shown on Table G-3 are indicated by arrows for selected comparisons.

Table G-5

ADJUSTED MEANS FOR COMBINED STANFORD PARAGRAPH MEANING SUBTEST, GRADE 3

(Individual Pupil Score as Unit)

		Treatments							
		Basal Reader Approach			Linguistic Approach		Total		
Ability Score Level	Sex	N	Mean		Mean	N	N	Mean	
	Boys	33	72.30		74.29	52			
High	Girls	50	73.42		73.19	49	184	73.40	←
	Cell Total	83	72.97	←NS→	73.76	101			
	Boys	28	60.40		55.96	45			
Average	Girls	29	57.68		59.54	35	137	58.14	.01
	Cell Total	57	59.01	←NS→	57.53	80			
	Boys	28	57.10		60.36	25			
Low	Girls	19	58.64		61.82	30	102	59.59	←
	Cell Total	47	57.72	←NS→	61.18	55			
Total	Boys	89	63.77		64.68	122	211	64.30	← NS
	Girls	98	65.89		66.02	114	212	65.96	←
Total Treatment		187	64.88	←NS→	65.32	236			

Significance levels corresponding to F's shown on Table G-3 are indicated by arrows for selected comparisons.

Table G-6

ADJUSTED MEANS FOR COMBINED STANFORD SPELLING SUBTEST,
GRADE 3
(Individual Pupil Score as Unit)

Ability Score Level	Sex	Treatments Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	33	47.20		47.48	52			
	Girls	50	51.67		50.92	49	184	49.48	←
	Cell Total	83	49.89	← NS →	49.15	101			
Average	Boys	28	36.54		34.73	45			
	Girls	29	36.50		41.57	35	137	37.22	.01
	Cell Total	57	36.52	← NS →	37.72	80			
Low	Boys	28	36.69		38.70	25			
	Girls	19	40.77		46.07	30	102	40.70	←
	Cell Total	47	37.34	← .05 →	42.72	55			
Total	Boys	89	40.54		40.98	122	211	40.79	← .01
	Girls	98	45.07		46.77	114	212	45.98	←
Total Treatment		187	42.91	← NS →	43.78	236			

Significance levels corresponding to F's shown on Table G-3 are indicated by arrows for selected comparisons.

Table G-7

ADJUSTED MEANS FOR COMBINED STANFORD WORD STUDY SKILLS SUBTEST, GRADE 3

(Individual Pupil Score as Unit)

		Treatments							
		Basal Reader Approach			Linguistic Approach		Total		
Ability Score Level	Sex	N	Mean		Mean	N	N	Mean	
High	Boys	33	82.43		75.03	52	184	79.59	←
	Girls	50	84.06		77.96	49			│
	Cell Total	83	83.41	← .01 →	76.45	101			│
Average	Boys	28	69.21		60.13	45			│
	Girls	29	67.51		63.37	35	137	64.38	
	Cell Total	57	68.35	← .01 →	61.55	80			│
Low	Boys	28	66.99		67.76	25			│
	Girls	19	69.49		65.46	30	102	67.19	←
	Cell Total	47	68.00	← NS →	66.50	55			
Total	Boys	89	73.41		68.04	122	211	70.31	← .05
	Girls	98	76.34		70.19	114	212	73.03	←
Total Treatment		187	74.95	← .01 →	69.08	236			

Significance levels corresponding to F's shown on Table G-3 are indicated by arrows for selected comparisons.

APPENDIX H

SELECTED TESTS AND FORMS USED WITH PUPILS IN SUBSAMPLES

Fry Phonetically Regular Words Oral Reading Test

Gates Word Pronunciation Test

Directions for administering writing samples

Note: The Fry test was used only in Grade 2 while the Gates test was used in both Grades 2 and 3. A different writing sample was obtained in each grade.

PHONETICALLY REGULAR WORDS ORAL READING TEST

1966 Version
Edward Fry, Rutgers University
New Brunswick, N. J.

Name______________________________ Date__________

School____________________Room __________ Code Number____

Examiner________________Number of words read correctly___

1. nap
2. pen
3. hid
4. job
5. rug
6. shade
7. drive
8. joke
9. mule
10. plain
11. hay
12. keen
13. least
14. loan
15. slow
16. stalk
17. haul
18. jaw
19. soil
20. joy
21. frown
22. trout
23. term
24. curl
25. birch
26. rare
27. star
28. porch
29. smooth
30. shook
31. yoke
32. glory
33. shy
34. quaff
35. taught
36. bundle
37. nix
38. civic
39. Philip
40. preach
41. cracked
42. swish
43. frankfurter
44. twelfth
45. drowse

Directions to Examiner: Have pupil read words from one copy while you mark another copy. Do not give a pupil second chance, but accept immediate self-correction. Let every pupil try the whole first column. If he gets two words correct from word number six on, let him try the whole second column. If he gets three words correct, let him try the whole third column. Mark correct words C and incorrect words X.

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GATES WORD PRONUNCIATION TEST

Examiner's Copy

Directions: Have the child read the words out loud Tell him you would like him to read some words for you. If he fails the first time, ask him to try the word again. Continue until ten consecutive words have been missed. As the words become difficult, special care should be taken to encourage the child. The score is one point for each word correctly pronounced on the first trial, one-half point for each word correctly pronounced on the second trial. (Note: 9½ correct would be scored as 10.)

---

1. so
2. we
3. as
4. go
5. the
6. not
7. how
8. may
9. king
10. here
11. grow
12. late
13. every
14. about
15. paper
16. blind
17. window
18. family
19. perhaps
20. plaster
21. passenger
22. wander
23. interest
24. chocolate
25. dispute
26. portion
27. conductor
28. brightness
29. intelligent
30. construct
31. position
32. profitable
33. irregular
34. schoolmaster
35. lamentation
36. community
37. satisfactory
38. illustrious
39. superstition
40. affectionate

Child's Name__________________________ Test Date_____________

Examiner______________________________ Birth Date____________

Age__________________

University of Pennsylvania

Second Grade Written Language Measures
USOE Cooperative Research Project

Directions to the Classroom Teacher

General Information

You are being asked to obtain one writing sample from each pupil in your classroom. We wish to emphasize the necessity of following the directions and procedures exactly.

As you realize, many other teachers throughout the nation will also be asked to obtain writing samples from their pupils. It is necessary, therefore, that these samples be obtained in all classrooms at approximately the same time and by following the same directions.

You are requested to obtain the writing sample on the morning of May 23, 1966 (within the ten days of testing, one year from previous year's testing).

Classroom Situation

No attempt should be made to enrich your normal room display through the use of word lists, pictures, dictionaries, etc. The classroom conditions should approximately those normally found in your daily writing activities.

Materials

The writing paper and pencils customarily used in your classroom should be used in obtaining this sample.

Identification

The pupil's name, teacher's name, and the school should be indicated on each pupil's paper.

Teacher Directions to the Pupils

(1) When all have finished writing name, etc., say... "Now put your pencils down. I am going to read a story about a frog named Hoppy. I want you to listen closely for I am going to omit the ending. When I have finished reading, I want you to take your pencil and tell me how you think the story should end."

"You will need to listen very carefully because I can't help you write this story. If you can't spell a word, just write it the way it sounds. Are there any questions?"

(If the question arises about asking for additional paper, tell the children that they may use as much paper as they feel is necessary. When two or three sheets are used, please see to it that they are properly coded and stapled.)

"Ready...Listen...Here is the story."

Hoppy was the most unusual frog that ever lived in Blue Swamp. Hoppy was different because of his color. All of the other frogs had brown skin, but not Hoppy. No, sir, he was a purple frog. He was different, too, because he never worried about anything. Life for Hoppy was just fun, fun, fun. But the thing that really made him different was that he turned somersaults instead of hopping and jumping as the other frogs did. This made the other frogs jealous, but Hoppy did not care. He was having fun.

One day Hoppy was hopping and somersaulting along, having fun like he always did, when he saw Racky, the racoon, hiding up in a tree.

"Hey, Racky," Hoppy shouted, "what are you doing up in the tree? Why don't you come down and have some fun with me?"

"Oh, no," said Racky, "Willie Crocodile is looking for his supper and I'm staying right here until it's safe to come down."

"Suit yourself," said Hoppy as he hopped along.

Soon he saw Brownie, the mouse, digging a hole in the ground.

"Hey, Brownie," yelled Hoppy, "how come you are digging that hole? Why don't you stop a while and play with me?"

"No, sir," replied Brownie, "Willie Crocodile is looking for his supper, and I'm going to hide until it's safe to come out again."

"Well, suit yourself," said Hoppy as he hopped along.

By and by, Hoppy met Mr. Owl. He was perched on a limb just above Hoppy's head.

"Oh, no," said Mr. Owl, "it's not safe to be funnin' especially when Willie Crocodile is looking for his supper. You'd better find a place to hide."

"Well, maybe so," replied Hoppy, "but I don't have time to hide, not when I can have fun instead." And he hopped along.

By now Hoppy was feeling real happy. He was jumping higher and higher as he went along. He jumped and turned over and over. Wheeee! He was having fun.

In his excitement, Hoppy didn't notice that Blue Swamp had become very quiet. It wasn't until he stopped to catch his breath that he noticed how quiet things really were. Not even the leaves stirred. He didn't know what to make of it.

Suddenly the silence was broken by a squeeking [sic] sound. It was Brownie running along beside him. All he kept saying was, "Run for your life Hoppy! Run!" Then Brownie scurried as fast as he could back to his hole in the ground.

Racky, the racoon, peeped out through the leaves of the tree he was hiding in. "Yes, yes, you'd better hurry Hoppy."

"Hoot, hoot!" cried Mr. Owl, "Go, Hoppy, go before it's too late."

(2) Upon completion of the reading say...

> "That's as much of the story as I can tell you. Now you tell me what you think happened."

(3) Once the children begin to write, begin timing them. They have *twenty* (20) minutes writing time. Stop them at the end of twenty (20) minutes. Children who finish ahead of time may go on to something else. Their papers should be collected upon finishing. Please try to keep those who finish early from interrupting those who are still writing. At the end of twenty (20) minutes writing ... say "Please stop writing."

It is particularly cautioned that no specific titles be presented, nor should picture or other stimuli be employed.

Other Procedures

No spelling help should be provided during the writing period. If pupils request spelling assistance, they should be told to try to spell the word and then encouraged to proceed.

If pupils *normally* use a simplified dictionary or write from display flash cards or use a speller, such practices may be allowed.

Under no circumstances, however, should you correct misspellings, give ideas, or assist the pupils beyond the point of general encouragement.

Time Limit

Following the heading of the paper, 20 minutes should be allowed for the pupils to finish their stories. Papers of pupils who finish early should be inconspicuously collected and a coloring exercise or a similar silent activity should be provided for the remainder of the twenty minutes.

Written Sample Identification

At the end of twenty minutes, all stories should be collected, packaged, and clearly labeled:

WRITING SAMPLE   Date________________
                  School________________

You are not to correct these stories; they will be corrected and scored by the Project Director's Staff who will apprise you of the correction procedures should you desire this information.

University of Pennsylvania

THIRD GRADE WRITTEN LANGUAGE MEASURES
USOE COOPERATIVE RESEARCH PROJECT

Directions to the Classroom Teacher

General Information

You are being asked to obtain one writing sample from each pupil in your classroom. We wish to emphasize the necessity of following the directions and procedures exactly.

As you realize, many other teachers throughout the nation will also be asked to obtain writing samples from their pupils. It is necessary, therefore, that these samples be obtained in all classrooms at approximately the same time and by following the same directions.

You are requested to obtain the writing sample immediately after the last Stanford Test has been administered.

DIRECTIONS

Classroom Situation

No attempt should be made to enrich your normal room display through the use of word lists, pictures, dictionaries, etc. The classroom conditions should approximate those normally found in your daily writing activities.

Materials

The writing paper and pencils customarily used in your classroom should be used in obtaining this sample.

Identification

The pupil's name, teacher's name, and the school should be indicated on each pupil's paper. In some cases, you might initial the back of each paper, or a code number may be assigned by your Project Director.

Teacher Directions to the Pupils

(1) When all have finished writing name, etc., say... "Now put your pencils down. I want you to listen closely for I am going to read you part of a story. I want you to listen closely because I can't help you write this story. If you can't spell a word, just write it the way it sounds. Are there any questions?"

(If the question arises about asking for additional paper, tell the children that they may use as much paper as they feel is necessary. When two or three sheets are used, please see to it that they are properly coded and stapled.)

"Ready...Listen...This is the story."

This is the story of a child just about your age. I am going to tell you the story exactly the way it began, but I can tell you only the beginning. Try to think of the things that might have happened next. You will have time to write your own ideas when I finish telling the first part of the story.

"I had a headache, so my mother suggested that I rest on my bed for a while. I didn't expect to fall asleep but I did. It's hard to say what was so unusual about my nap but when I woke up . . . !!! There wasn't a single thing anywhere around me that I had ever seen before. Even the date on the calendar in the kitchen was different. The year was 2967. I went to the window and looked outside. I saw..."

(2) Upon completion of the reading say...

"That's as much of the story as I can tell you. Now you write what you think happened."

(3) Once the children begin to write, begin timing them. They have twenty (20) minutes writing time. Stop them at the end of twenty (20) minutes. Children who finish ahead of time may go on to something else. Their papers should be collected upon finishing. Please try to keep those who finish early from interrupting those who are still writing. At the end of twenty (20) minutes writing. . . say "Please stop writing."

It is particularly cautioned that no specific titles be presented, nor should picture or other stimuli be employed.

Other Procedures

No spelling help should be provided during the writing period. If pupils request spelling assistance, they should be told to try to spell the word and then encouraged to proceed.

If pupils normally use a simplified dictionary or write from display flash cards or use a speller, such practices may be allowed.

Under no circumstances, however, should you correct misspellings, give ideas, or assist the pupils beyond the point of general encouragement.

Time Limit

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Written Sample Identification

At the end of twenty minutes, all stories should be collected, packaged, and clearly labeled:

WRITING SAMPLE (Date_______________)
(School_____________)

You are not to correct thess stories; they will be corrected and scored by the Project Director's Staff who will apprise you of the correction procedures should you desire this information.

OE 6000 (REV. 9-66)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF EDUCATION

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TITLE Comparison of a Basal Reader Approach and a Linguistic Approach in Second and Third Grade Reading Instruction. Final Report

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IDENTIFIERS

ABSTRACT

This project was a two year continuation of one of the 27 U.S.Office of Education First Grade Reading Studies. Pupils in the linguistic approach were initially taught to read using the experimental edition of A Basic Reading Series Developed upon Linguistic Principles by Charles C. Fries, and others. Pupils in the basal reader approach were initially taught to read using the New Basic Readers (sixties edition) by Scott, Foresman. Data were analyzed by total treatment, ability score level and sex. When the two treatment groups were considered as a whole, (without breakdown by ability level or sex), and when performance on all of the criterion measures were considered, neither of the two approaches proved to be more effective at the end of grade 2 and at the end of grade 3. Although significant differences were found for some of the subskills for reading or related areas, neither of the approaches demonstrated superior performance in all, or even most, aspects of the reading process. At the end of grade 2, pupils in the basal reader treatment showed significantly superior achievement in word study skills, spelling, and accuracy of oral reading. At the end of grade 3, pupils in the linguistic group demonstrated superior performance in rate of oral reading and in the number of words written in compositions. Differences for sexes and ability score levels and teacher characteristics were also studied.